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San Juan Basin Action Plan

SOCIAL AND ECONOMIC CONDITIONS TECHNICAL REPORT

for the
Environmental Impact Statement
on Public Service Company of New Mexico's
Proposed New Mexico Generating Station
and Possible New Town

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United States
Department
of the Interior

Bureau of Land Management
New Mexico State Office
Santa Fe, New Mexico

October 1982

Report 21 of 22

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BUREAU OF LAND MANAGEMENT
NEW MEXICO STATE OFFICE
P.O. BOX 1449
SANTA FE, NEW MEXICO 87501

IN REPLY REFER TO
NM30840EIS
1792.73(934A)

October 1982

Dear Interested Citizen:

Attached is one of twenty-two technical reports developed as a basis for writing the Environmental Impact Statement on Public Service Company of New Mexico's Proposed New Mexico Generating Station and Possible New Town (NMGS EIS). (A list of the technical reports is attached.)

These technical reports provide detailed information on the existing environment, methods used for the impact analysis, and related data supportive of the analysis and conclusions presented in the EIS. These reports should be retained for use with the Draft and Final EIS and other documents related to BLM's San Juan Basin Action Plan (SJBAP).

The Draft NMGS EIS will be filed with the Environmental Protection Agency and released for public review on November 30, 1982. Comments on the Draft EIS will be due by close of business February 7, 1983, at the BLM New Mexico State Office. Because of the large volume of material presented in the technical reports, the BLM is distributing these reports in advance of the Draft EIS to provide sufficient time for public review. The technical reports will be available for public review at the places indicated on the attached list. Copies will also be available from the BLM New Mexico State Office, U.S. Post Office and Federal Building, Santa Fe, for a copy fee.

Informational public meetings are scheduled for December 1982 to provide a public forum to clarify questions and concerns about the SJBAP proposals and the related environmental documents, which will all have been issued by that time. The meetings are scheduled as follows:

- December 14, Civic Center, Farmington, 3 to 9 PM
- December 14, Convention Center, Albuquerque, 3 to 9 PM
- December 15, Chapter House, Crownpoint, 3 to 9 PM
- December 16, Holiday Inn, Gallup, 3 to 9 PM
- December 16, Kachina Lodge, Taos, 3 to 9 PM

In addition, formal public hearings will be held in January 1983 to solicit public comments on the SJBAP Proposals. These meetings are scheduled as follows:

- January 10, Chapter House, Crownpoint, beginning at 1:00 PM
- January 12, Civic Center, Farmington, beginning at 9:00 AM
- January 14 (and 15th if necessary because of the number of registrants), Four Seasons Motor Lodge, Albuquerque, I-40 and Carlisle Blvd., beginning at 9:00 AM (each day)

Questions on the public meetings, hearings, and the technical reports themselves should be directed to:

Leslie M. Cone
NMGS Project Manager
BLM, New Mexico State Office
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-6184 FTS 476-6184

Sincerely yours,

Charles W. Luscher

Charles W. Luscher
State Director, New Mexico

List of Technical Reports

1. Purpose and Need
2. Project Description
3. Alternatives to the Project
4. Site Alternatives
5. Permit Reconnaissance
6. Air Quality
7. Geologic Setting
8. Mineral Resources
9. Paleontology
10. Soils, Prime and Unique Farmlands
11. Hydrology
12. Water Quality
13. Vegetation
14. Wildlife and Aquatic Biology
15. Threatened and Endangered Species
16. Cultural Resources
17. Visual Resources
18. Recreation Resources
19. Wilderness Values
20. Transportation
21. Social and Economic Conditions
22. Land Use Controls and Constraints

Availability of Technical Reports for Public Review

Individual copies of the technical reports can be obtained for a copy fee. Inquiries should be directed to:

Bureau of Land Management, New Mexico State Office
Title Records and Public Assistance Section (943B)
U.S. Post Office and Federal Building
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-6107 FTS 476-6107

Copies of the reports are available for public review at the locations listed below. [Formal and informal cooperating agencies are denoted by an asterisk (*).]

BUREAU OF LAND MANAGEMENT OFFICES

New Mexico State Office

NMGS Project Staff (934A)
Room 122, Federal Building
Cathedral Place
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-6184 FTS 476-6184

San Juan Energy Projects Staff (911)
Room 129, Federal Building
Cathedral Place
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-6226 FTS 476-6226

Public Affairs Staff (912)
Room 2016
U.S. Post Office and Federal Building
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Santa Fe, NM 87501
(505) 988-6316 FTS 476-6316

Division of Resources(930)
509 Camino de los Marquez, Suite 3
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-6212 FTS 476-6212

Albuquerque District Office

3550 Pan American Freeway NE
P.O. Box 6770
Albuquerque, NM 87107
(505) 766-2455 FTS 474-2455

Farmington Resource Area Headquarters
900 La Plata Road
P.O. Box 568
Farmington, NM 87401
(505) 325-3581

Taos Resource Area Office
Montevideo Plaza
P.O. Box 1045
Taos, NM 87571
(505) 758-8851

Socorro District Office

198 Neel Avenue
P.O. Box 1219
Socorro, NM 87801
(505) 835-0412 FTS 476-6280

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Las Cruces, NM 88001
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Roswell District Office

1717 W. Second Street
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Carlsbad Resource Area Headquarters
114 S. Halagueno Street
P.O. Box 506
Carlsbad, NM 88220
(505) 887-6544

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Santa Fe, NM 87503
(505) 827-5217, ext. 2416

New Mexico Energy and Minerals Department*
525 Camino de los Marquez
P.O. Box 2770
Santa Fe, NM 87503
(505) 827-3326

New Mexico Historic Preservation Bureau*
State Historic Preservation Officer
505 Don Gasper Avenue
Santa Fe, NM 87503
(505) 827-2108

New Mexico Natural Resource Department*
Villagra Building
Santa Fe, NM 87503
(505) 827-5531

New Mexico Public Service Commission*
Bataan Memorial Building
Santa Fe, NM 827-3361
(505) 827-3361

New Mexico State Engineer's Office*
Bataan Memorial Building
Santa Fe, NM 87503
(505) 827-2423

New Mexico State Planning Office*
505 Don Gaspar Avenue
Santa Fe, NM 87503
(505) 827-5191

OTHER ORGANIZATIONS

Public Service Company of New Mexico
Alvarado Square
P.O. Box 2268
Albuquerque, NM 87158
(505) 848-2700

Woodward-Clyde Consultants, Inc.
3 Embarcadero Center, Suite 700
San Francisco, California 94111
(415) 956-7070

PUBLIC AND UNIVERSITY LIBRARIES

Reading copies of the NMGS EIS and associated technical reports will be available at the following public and university libraries:

State and Public Libraries

Albuquerque Public Library
501 Copper Avenue NW
Albuquerque, NM 87102

Aztec Public Library
201 W. Chaco
Aztec, NM 87401

Crownpoint Community Library
c/o Lioness Club, P.O. Box 731
Crownpoint, NM 87313

Cuba Public Library
Box 5, La Jara
Cuba, NM 87027

Farmington Public Library
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Farmington, NM 87401

Gallup Public Library
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Gallup, NM 87301

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P.O. Box 96
Grants, NM 87020

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Albuquerque, NM 87198
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Bureau of Indian Affairs*
Eastern Navajo Agency
P.O. Box 328
Crownpoint, NM 87313
(505) 786-5228

Bureau of Indian Affairs*
Navajo Area Office
Box M - Mail Code 305
Window Rock, AZ 86515
(602) 871-5151 FTS 479-5314

Bureau of Reclamation*
Upper Colorado Regional Office
125 S. State Street
P.O. Box 11568
Salt Lake City, UT 84147
(801) 524-5463 FTS 588-5463

Minerals Management Service*
South Central Region
505 Marquette Avenue NW, Suite 815
Albuquerque, NM 87102
(505) 766-1173 FTS 474-1173

Minerals Management Service*
Resource Evaluation Office
411 N. Auburn
Farmington, NM 87401
(505) 327-7397 FTS 572-6254

National Park Service*
Southwest Regional Office
1100 Old Santa Fe Trail
Santa Fe, NM 87501
(505) 988-6375 FTS 476-6375

National Park Service*
Environmental Coordination Office
Pinon Building, 1220 St. Francis Drive
P.O. Box 728
Santa Fe, NM 87501
(505) 988-6681 FTS 476-6681

U.S. Fish and Wildlife Service*
Field Supervisor, Ecological Services
3530 Pan American Highway, Suite C
Albuquerque, NM 87107
(505) 766-3966 FTS 479-3966

U.S. Geological Survey (WRD)*
505 Marquette Avenue, Room 720
Albuquerque, NM 87101
(505) 766-2810 FTS 474-2817

OTHER FEDERAL AGENCIES AND ORGANIZATIONS

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Region VI
1201 Elm Street
Dallas, TX 75270
(214) 767-2716 FTS 729-2716

Navajo Tribe*
c/o Division of Resources
P.O. Box 308
Window Rock, AZ 86515
(602) 871-6592

Pueblo of Zia*
General Delivery
San Ysidro, NM 87053
(505) 867-3304

Soil Conservation Service*
424 N. Mesa Verde
Aztec, NM 87410
(505) 334-9437

U.S. Corps of Engineers*
P.O. Box 1580
Albuquerque, NM 87103
(505) 766-2657 FTS 474-2657

USDA, Forest Service*
717 Gold Avenue
Albuquerque, NM 87102
(505) 474-1676 FTS 474-1676

USDA, Forest Service*
District Ranger
Mt. Taylor Ranger District
201 Roosevelt Avenue
Grants, NM 87020
(505) 287-8833

SOCIAL AND ECONOMIC CONDITIONS TECHNICAL REPORT

for the

Environmental Impact Statement
on Public Service Company of New Mexico's
Proposed New Mexico Generating Station
and Possible New Town

Prepared by

Woodward-Clyde Consultants

for the

U.S. Department of the Interior
Bureau of Land Management

NEW MEXICO GENERATING STATION

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CONSULTATION AND COORDINATION

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INTRODUCTION

BACKGROUND

Included in the recent Council on Environmental Quality Regulations (1979) are several important objectives to reduce excessive paperwork in the preparation of environmental impact statements (EISs):

- Discuss only briefly issues other than significant ones.
- Emphasize the portions of the EIS that are useful to decision makers and the public and reduce emphasis on background material.
- Prepare analytic rather than encyclopedic EISs.

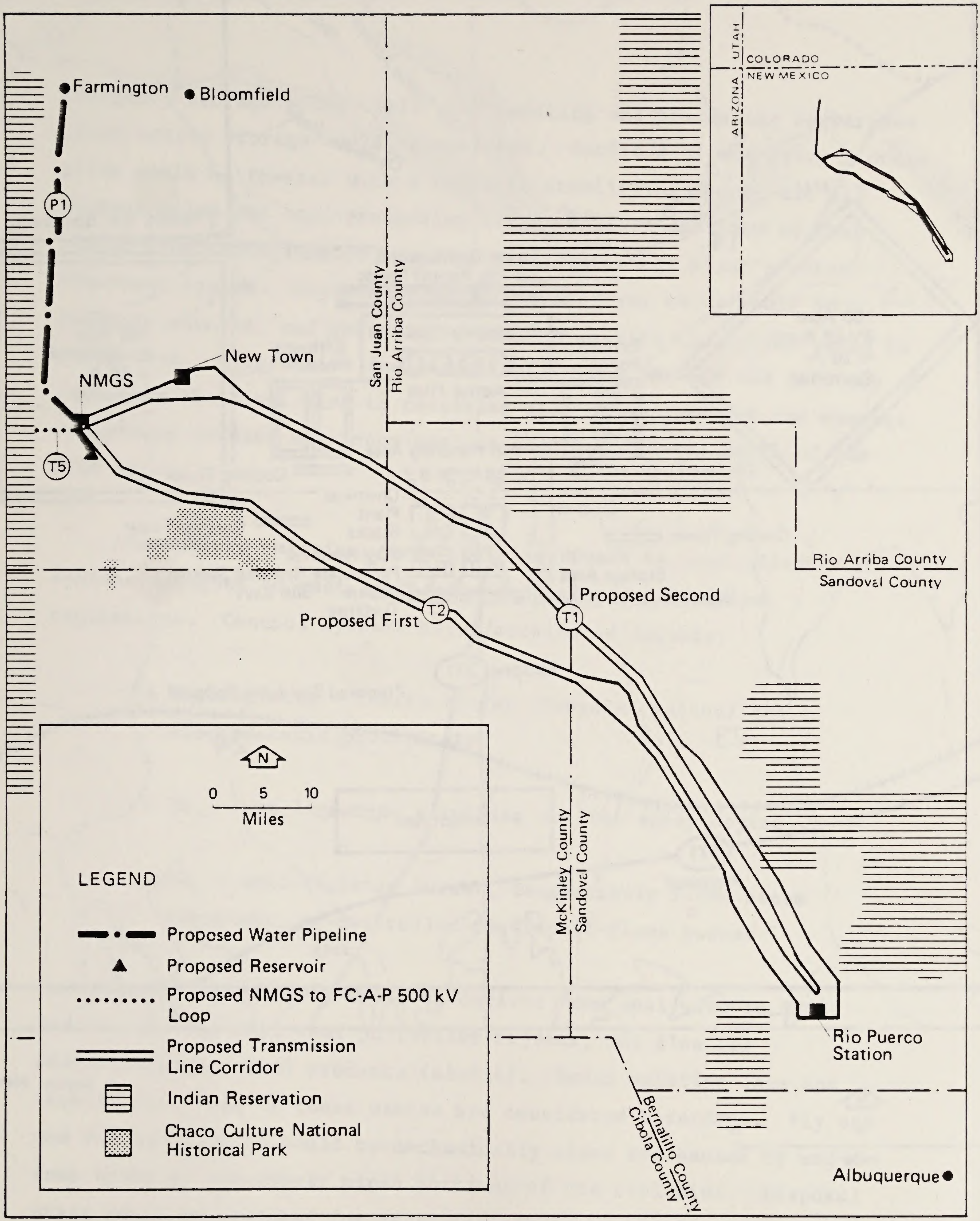
In order to accomplish these objectives and still provide the depth and background required for an analytic impact statement, this technical report has been prepared for the New Mexico Generating Station (NMGS) project. In this report, impacts that were not identified as significant but which are still considered important by the public or technical specialists are analyzed. Background material is provided for those issues and impacts that were considered necessary for the comparison of alternatives. Impacts that were not identified as significant or important by the public and by technical preparers are summarized, and reasons for their elimination from detailed analysis are discussed.

SUMMARY DESCRIPTION OF PROJECT COMPONENTS

Public Service Company of New Mexico (PNM) proposes to construct a 2000-megawatt (MW) coal-fired electric generation plant approximately 35 miles south of Farmington, New Mexico, in San Juan County (Map 1-1). The proposed NMGS, at ultimate development, would have four 500-MW generating units. Each generating unit would include a turbine generator area, coal pulverizer area, boiler area, particulate removal system, SO_2 removal system, and chimney stack. The proposed arrangement of these and other power plant components is shown in Figure 1-1. For the environmental analysis, it was assumed that commercial operation of the first 500-MW unit would begin in 1990 and that other units would start operating during the 1990s.

Coal for NMGS would be acquired through long-term contracts with Sunbelt Mining and Arch Minerals (Proposed Action) or other producers in the San Juan Basin (alternative coal supply). Coal acquired from a joint venture of Sunbelt and Arch Minerals would be supplied from surface mines (referred to as the Bisti mine in this analysis) in the immediate vicinity of the proposed plant site. Coal acquired from other producers in the San Juan Basin would be hauled from mines located as much as 30 miles from the proposed plant site. Coal required for NMGS would average 7.5 million tons per year, or a total of 300 million tons over the 40-year project life.

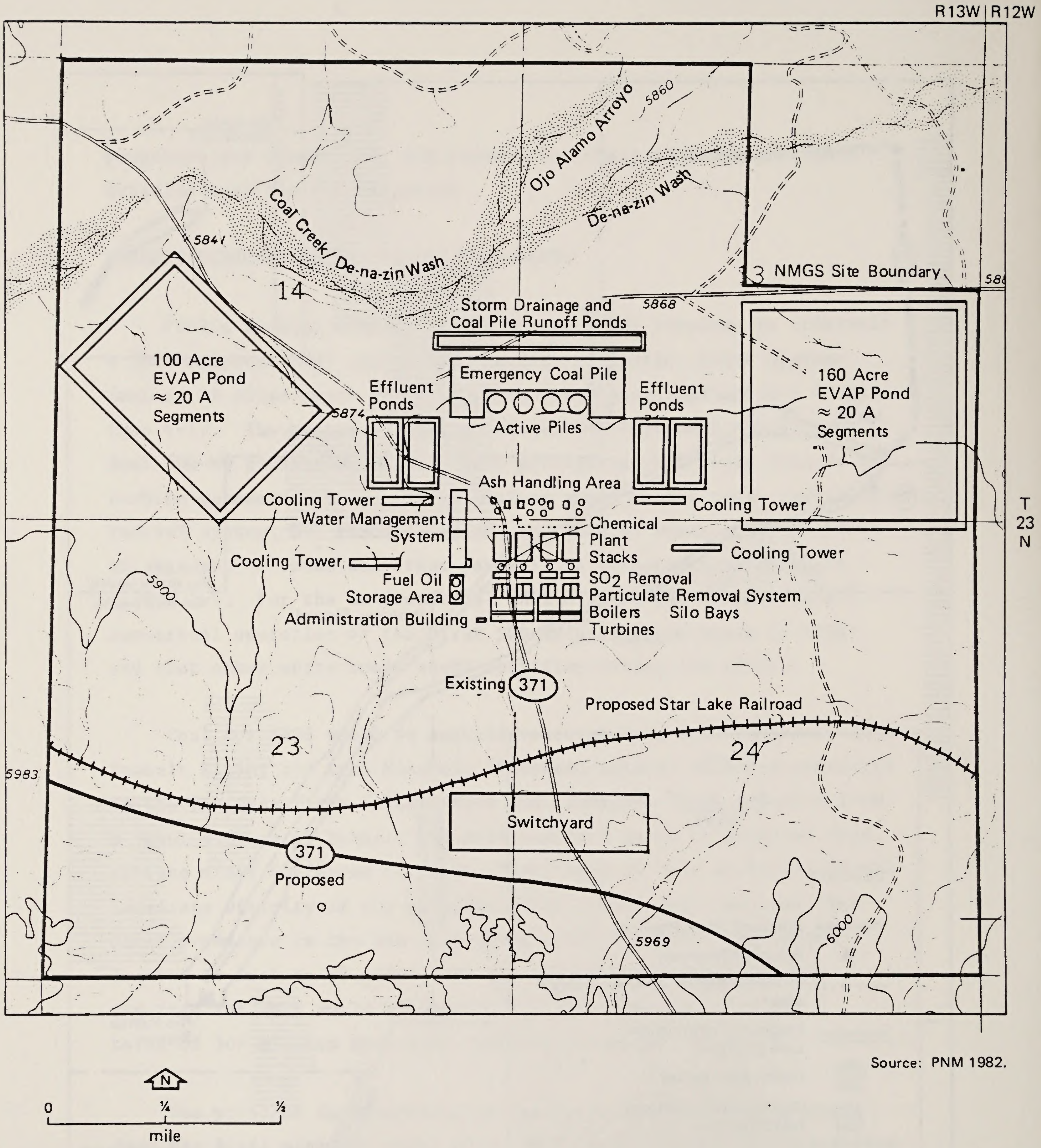
The proposed fuel-handling system would involve hauling coal from the Bisti mine (or other mine locations) by truck to a receiving facility located adjacent to the NMGS site. Coal would then be transferred via conveyor belt from the receiving station to active or



Note: For more information, see the location maps in Appendix G of the EIS.

Source: BLM 1982.

Map 1-1. GENERAL LOCATION OF PROPOSED ACTION



Source: PNM 1982.

Figure 1-1. STATION LAYOUT

emergency storage piles. All coal-handling and processing operations after active storage would be enclosed. Surfaces of emergency storage piles would be treated with a nontoxic stabilizing agent, and all storage piles and coal-processing areas would be designed so that runoff from precipitation would be diverted to the plant's water treatment system. Any coal spills from conveyor belts would be promptly removed, and percolation beneath on-site stockpiles would be controlled. Alternative fuel-handling systems include the delivery of coal from the Bisti mine to receiving station by conveyor and storage of primary crushed emergency coal on Sunbelt property north of the NMGS site.

Atmospheric emissions from the plant would be controlled by systems designed to meet applicable federal and New Mexico regulations. Control systems being considered include:

- Particulates - fabric filter (Proposed Action) and electrostatic precipitator
- SO_2 - wet limestone scrubbing or lime spray drying
- NO_x - dual-register burner, tangentially fired steam generator, or controlled-flow/split-flame burner

Four types of waste would be derived from coal used in NMGS: bottom ash, fly ash, coal pulverizer rejects, and flue gas desulfurization (FGD) products (sludge). Under existing laws and regulations, none of these wastes are considered hazardous. Fly ash and FGD by-products would be mechanically mixed and hauled by end-dump truck to previously mined portions of the coal mine. Disposal areas would be prepared for receiving ash by backfilling with mine overburden. Ash would then be dumped and spread in layers over the mine overburden. After the ash was placed and spread, it would be covered with layers of overburden and surface soil or topsoil and then a vegetative cover would be established. Bottom ash and pulverizer rejects would be collected for disposal in dewatering bins and then hauled by end-dump trucks for disposal into previously mined portions of the coal mine. Procedures for disposal would be the same as for fly ash.

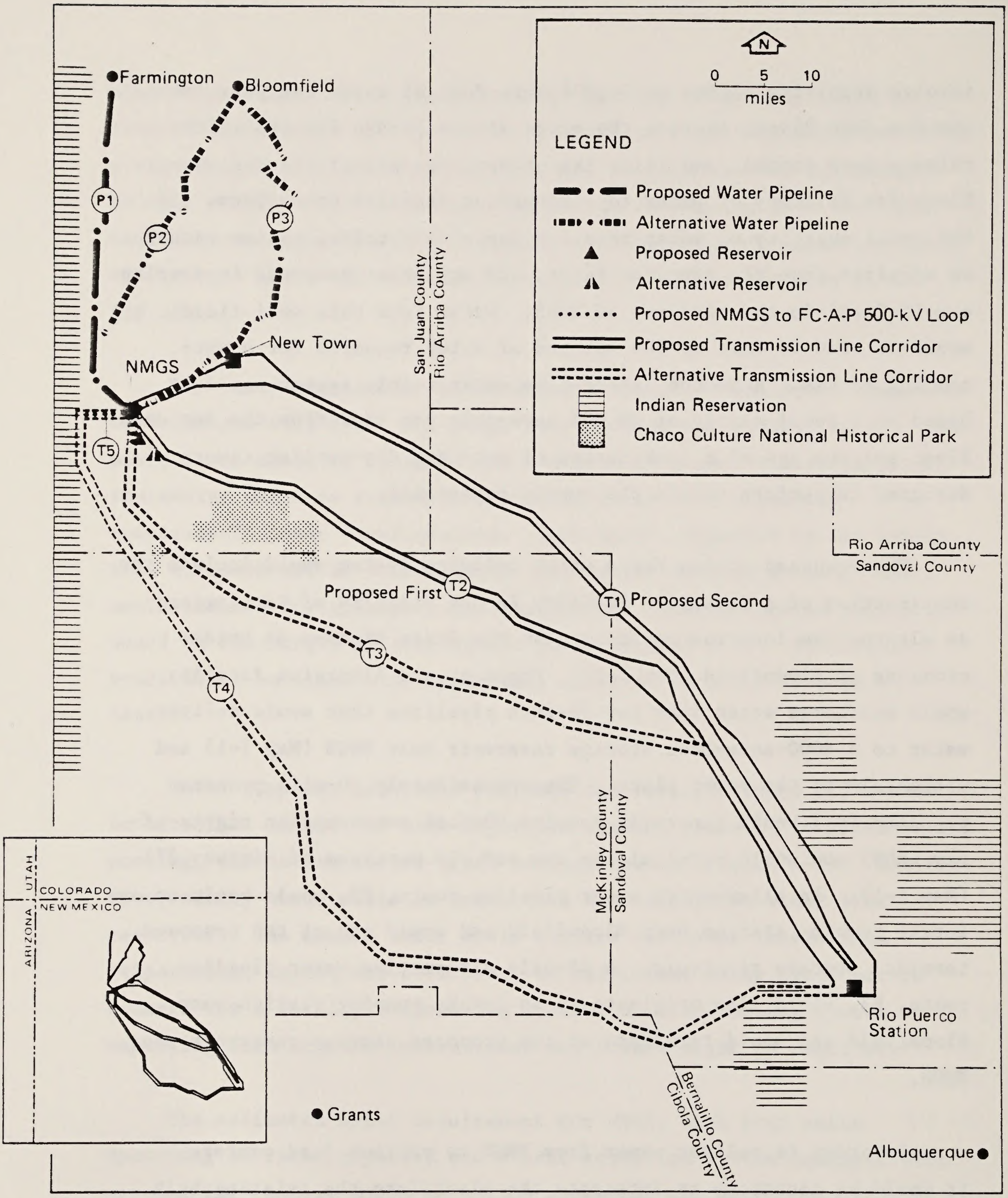
The water management system would contain all equipment necessary to treat and supply all the plant makeup water and potable water. The power plant would be designed and operated as a zero-discharge plant; wastewater would be reused by cascading it to uses requiring successively lower water quality. Used water, degraded to the extent that it could not be economically treated for further in-plant use, would be used for transport and disposal of plant-generated wastes or would be discharged to evaporation ponds (Figure 1-1). Evaporation ponds would be lined with impervious material to limit seepage losses.

Water supplies available for NMGS are believed to be sufficient to construct an all-wet heat-rejection system, based on evaporative cooling, and to use forced-draft cooling towers (Figure 1-1). Cooling-tower makeup water would be drawn from the nearby raw-water storage reservoir. The makeup water would replace the tower losses from evaporation, drift, and blowdown. If sufficient water could not be secured for a totally evaporative system, a water-cooling system employing both dry and conventional wet towers might be required.

The estimated water requirement for NMGS, with four units operating at rated capacity and a heat-rejection system equipped with wet-cooling towers, would be 35,000 acre-feet per year. In order to supply this quantity of water to NMGS, the Proposed Action would involve acquiring rights to 35,000 acre-feet of water per year from the San Juan River, storing the water in the Navajo Reservoir for release upon demand, and using the natural channel of the San Juan River for delivery of water to a diversion facility downstream. If the total quantity of water required for a wet-cooling system cannot be acquired from the San Juan River, the applicant proposes to develop a well field in the vicinity of NMGS. Water from this well field would be used to make up the balance of water required for a wet-cooling system. A second alternative water supply system would be based on a total supply of 20,000 acre-feet per year from the San Juan River and the use of a combination of wet- and dry-cooling towers designed to perform within the supply constraint.

The Proposed Action for a water delivery system would include the construction of a diversion facility in the vicinity of Farmington; an alternative location would be near the State Highway 44 bridge crossing at Bloomfield (Map 1-2). Pumps at the diversion facility would discharge water into two 36-inch pipelines that would deliver water to a 4000-acre-foot storage reservoir near NMGS (Map 1-1) and ultimately to the power plant. The approximately 40-mile proposed pipeline (P1) would generally require 90-foot construction rights-of-way (ROW) and would parallel the new and old portions of Highway 371 (Map 1-1). An alternative water pipeline route, P2, would begin at an intake pumping station near Bloomfield and would end at the proposed terminal storage reservoir. A 49-mile alternative water pipeline route, P3, would also originate at an intake pumping station near Bloomfield and would terminate at the proposed storage reservoir near NMGS.

In order to deliver power from NMGS to various load centers, it would be necessary to integrate the plant into the existing bulk



Note: For more information, see the location maps in Appendix G of the EIS.

Source: BLM 1982.

Map 1-2. GENERAL LOCATION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION transmission systems of PNM and neighboring utilities. Thus the proposed transmission system would consist of a 500-kilovolt (kV) loop linking NMGS with PNM's approved 500-kV Four Corners-Ambrosia-Pajarito (FC-A-P) line, located approximately 5 miles west of NMGS, and two 500-kV lines linking NMGS with the Albuquerque distribution and load center at the proposed Rio Puerco Station (Map 1-1). The NMGS-Albuquerque system would be installed in phases: the 500-kV loop in 1990 with commencement of commercial operation of Unit 1, the first 500-kV line with Unit 2 in 1993, and the second 500-kV line with Unit 4 in 1998.

Four routes are considered technically and economically feasible for construction of the 500-kV transmission system. Route T2 is proposed for the first 500-kV line and route T1 is proposed for the second 500-kV line; routes T3 and T4 are alternatives to the Proposed Action. The total distance traversed would be similar for the two proposed and two alternative corridors: 101 miles (T2), 107 miles (T1), 105 miles (T3), and 126 miles (T4). With the exception of tower sites, the proposed 200-foot ROW could support other compatible land uses, such as grazing. PNM would keep the transmission line ROW closed and would patrol the line by helicopter each month. Lands disturbed by heavy equipment and temporary access roads would be restored to their original condition.

Table 1-1 displays construction work force estimates over time. Construction employment for station facilities would reach peaks of 1515 employees in 1987 and 1530 employees in 1992. Operations employment at station facilities would increase steadily, from 30 employees in 1989 to 900 employees in 1999 when all four units are expected to be on-line.

Table 1-1. NMGS CONSTRUCTION AND OPERATION EMPLOYMENT

			NMGS											
			Construction					Operation						
Year	Intake Pipeline and Reservoir	500-kV Transmission Line	Unit 1	Unit 2	Unit 3	Unit 4	Total	Unit 1	Unit 2	Unit 3	Unit 4	Total	Total Employment	Annual Change
1985	—	—	85	—	—	—	85	—	—	—	—	—	85	+85
1986	—	—	800	—	—	—	800	—	—	—	—	—	800	+715
1987	115	—	1515	—	—	—	1630	—	—	—	—	—	1630	+830
1988	295	104	1180	30	—	—	1505	—	—	—	—	—	1505	-125
1989	—	—	360	450	—	—	914	30	—	—	—	30	944	-560
1990	—	—	100	940	40	—	1080	200	—	—	—	200	1280	+336
1991	—	—	—	750	570	—	1320	250	—	—	—	250	1570	+290
1992	—	—	—	270	1260	—	1530	250	24	—	—	274	1804	+234
1993	—	—	—	105	955	30	1090	250	160	—	—	410	1500	-304
1994	—	78	—	—	325	435	838	250	200	30	—	480	1318	-182
1995	—	—	—	—	90	940	1030	250	200	200	—	650	1680	+362
1996	—	—	—	—	—	775	775	250	200	250	—	700	1475	-205
1997	—	—	—	—	—	255	255	250	200	250	24	724	979	-496
1998	—	—	—	—	—	95	95	250	200	250	160	860	955	-24
1999	—	—	—	—	—	—	0	250	200	250	200	900	900	-55

Source: PNM 1980, unpublished data.

According to PNM (unpublished data, 1980), estimated construction employment skill requirements would be as follows:

Skill	Percent of Total Construction Work Force
Boilermakers	9.4
Pipefitters	14.2
Electricians	14.4
Carpenters	5.6
Ironworkers	10.0
Operators	10.0
Laborers	9.0
Teamsters	4.1
Cement masons	0.8
Millwrights	3.3
Insulators	4.0
Sheetmetal workers	1.1
Painters	1.2
Others	0.5
Supervision	12.4

The above estimates are averaged for construction of all four units.

SAN JUAN BASIN ACTION PLAN OVERVIEW AND RELATIONSHIP OF THE NMGS EIS TO ACTIONS INCLUDED IN THE PLAN

The proposed site for the NMGS is located in the San Juan Basin of northwestern New Mexico. The Bureau of Land Management (BLM) is responsible for the management of much of the land and mineral resources in this area, and currently has six separate but interrelated proposals under consideration within the basin. In order to respond to these, the BLM has developed a San Juan Basin Action Plan (SJBAP). This plan provides for the organizational arrangements whereby the environmental analyses and decision making can be implemented in a timely and efficient manner. The plan describes the process for preparation of three site-specific EISs (including the NMGS EIS) and three Environmental Assessments (EAs):

- Coal Preference Right Lease Applications (EA)
- San Juan River Regional Coal Leasing (EIS)
- Wilderness Study Areas (WSAs) (EIS)
- New Mexico Generating Station (EIS)
- Ute Mountain Land Exchange (EA)
- Bisti Coal Lease Exchange (EA)

In addition to these documents, the action plan provides for the preparation of a Cumulative Overview (CO). The CO is intended to focus on the cumulative impacts that would result from the proposed actions analyzed in the EISs and EAs listed above and therefore to facilitate public review and decision making. As a result of this organization, the impact analysis in the NMGS EIS and technical background reports concentrates on the impacts expected to result from the specific NMGS components proposed. The cumulative impacts expected to result from the proposed NMGS, in addition to the cumulative impacts of other proposals to be developed in the same time period, are described in the CO.

BASELINE CONDITIONS ASSUMED FOR THE NMGS TECHNICAL REPORT IMPACT ANALYSES

The site-specific impact analysis for this technical report was based on the affected environment and available resources that would be existing at the time of construction and operation of the NMGS facility. Since construction at the NMGS facility would not begin until 1985, certain assumptions regarding project development in the San Juan Basin were necessary. Two levels of project development were considered, along with criteria for each, in developing a status for the various non-SJBAP actions proposed for the San Juan Basin area.

- Baseline 1 - The projects considered in this level of development are those that have approval and are to be built or under construction in 1985. This level represents the projected existing environment without the proposals included in the SJBAP.
- Baseline 2 - The projects considered in this level are in some phase of the application stage. In this level, Baseline 1 projects are added to any projects in Baseline 2 along with any revision in resource production or uses (e.g., coal).

Where differences in Baselines 1 and 2 affect the results of impact analyses, discussion is provided. If no differences are identified, it should be assumed that consideration of the two different baselines did not alter the impact analyses.

A complete list of projects and comprehensive location maps for Baselines 1 and 2 are provided in Appendix C of the NMGS EIS.

ORGANIZATION OF THE REPORT

Section 2.0 of this technical report describes the assumptions and methodological approach used in the assessment of potential impacts of the Proposed Action on social and economic conditions in the affected environment. In addition, Section 2.0 contains a definition of the study area and identification of data sources.

Section 3.0, Affected Environment, contains baseline data on existing social and economic conditions in the study area, as well as projections of future conditions without the Proposed Action. Information on historical trends is presented where it is useful in providing a basis for predicting most likely future trends. The description of projected future trends takes into consideration the changes in the social and economic environment that are expected to occur as a result of the projects identified in Baseline 1. This provides a reasonable estimate of the future existing environment against which the potential impacts of the Proposed Action and alternatives can be assessed.

Section 4.0 describes the potential social and economic effects of implementing the Proposed Action and alternatives. Impacts identified are measured against indicators of significance in order to estimate the importance of the impact to the affected human environment. (Potential impacts associated with alternatives to the Proposed Action are compared in Section 9.0.)

In Section 5.0, mitigation measures are suggested. These measures would help to alleviate the potentially significant adverse impacts or enhance the beneficial impacts identified in the Section 4.0 analysis. Those potentially adverse impacts for which no appropriate mitigation measures have been suggested are discussed in Section 6.0 as "unavoidable adverse impacts."

Appendix A describes the input-output model and assumptions used to project future population and employment in the affected environment. Appendix B describes the gravity model and assumptions used to predict allocation of in-migrating residents to existing communities in the study region. Appendix C provides a detailed description of fiscal impact assessment methodology. Appendix D provides an analysis of the potential impacts of the Proposed Action on traditional Navajo values and lifestyles. In addition, it presents a traditional Navajo perspective on the overall environmental impacts that would result from the project.

2.0

FRAMEWORK FOR ANALYSIS

APPROACH

The basic approach used in this assessment reflects the general process for identifying social and economic impacts for an EIS. The basic steps in the process include:

- Identifying the potentially affected community or communities
- Determining which aspects of the social and economic environment are most likely to be affected by the proposed action
- Defining indicators that can be applied to determine whether a potential impact would be considered significant or not significant
- Projecting future social and economic conditions in the study region without the proposed action, including projects planned for the same approximate time period
- Projecting future social and economic conditions in the study region with the project

- Determining which changes in future social and economic conditions could be directly or indirectly attributed to the project

- Developing alternative mitigation measures that could help alleviate any potentially adverse or enhance potentially beneficial impacts

Baseline 1 projects were considered in projecting future social and economic conditions in the affected environment without the proposed action. This baseline represents a reasonable projection of future social and economic conditions based on available data and knowledge about proposed or likely major projects that would occur in the study region during the same time period as the construction and operation of the proposed action. The distinction between the Baseline 1 and Baseline 2 resulted in impact differences that were too small to warrant detailed analysis and comparison in this technical report.

It is important to note that the figures generated through this analysis are estimates of future social and economic conditions in the study area based on a specific set of assumptions. The information contained in both Baseline 1 and in the description of the proposed action represents the best project planning information that was available at the time of the analysis. Elements of construction timing or labor requirements may change as proponents refine their project planning. Nonetheless, the projections resulting from consideration of Baseline 1 activities reflect a reasonable guide to the type and magnitude of changes that are likely to occur in the affected social and economic environment.

Population projections are based on natural increase and population change resulting both directly and indirectly from Baseline 1 and the proposed action. Indirect employment is estimated through the use of an input-output model. Total employment impacts are translated into population change based on a consideration of the availability of labor in the local area, household size of in-migrating workers, and the number of additional workers in in-migrating households. The in-migrating population is then allocated to existing communities by a gravity model (see Appendix B-1). Project-related housing demands are determined in addition to demands on public services and facilities (projected services and facilities demands are generally based on a continuation of current levels of service) and changes in public revenues and expenditures (for a detailed description of employment, population, and fiscal projections and population allocations, see Appendices A, B, and C).

STUDY AREA

The socioeconomic study was designed to focus on an area within which the major socioeconomic impacts resulting from the proposed action would be likely to occur. Because the construction and operation of the proposed NMGS (as opposed to the water supply and transmission line system) would be the primary catalyst for socioeconomic changes, the identification of the study region focused on defining the areal extent of the plant-related changes. The principal project inputs that would trigger changes in the socioeconomic environment are project-related jobs and taxes. In terms of taxes, the most significant project-related revenues would accrue to taxing jurisdictions that encompass the plant site. In the case of the NMGS, those jurisdictions would include San Juan County and the Farmington School District. In terms of project-related jobs, the construction and operation of the NMGS would provide employment for both local and nonlocal workers. (Local workers are defined as people who would not change their place of residence to work on the project, and nonlocal workers are people who would.) For the purposes of identifying communities in the project area that would potentially be significantly affected by the proposed action, the analysis focused on locating residency alternatives for in-migrating workers and their families, who represent the greatest impacting agent at the community level.

Residential preference of in-migrating workers would be governed by a combination of factors that includes: commuting time and distance, availability and cost of housing, community amenities, anticipated length of employment, needs of accompanying family members, and jurisdictional constraints. (Jurisdictional constraints include restrictions placed on persons living within the Navajo Nation. For example, non-Native Americans generally may not reside on Native American land within the Navajo Nation.) The analysis, which included an examination of current and projected transportation networks and established settlement patterns, assumes that relocating project-related workers would reside in existing communities located within daily commuting distance of the plant site. (While it is possible that a new town could be developed near the plant site at some future date, in conjunction with other resource developments in the region, the existence of a new town was not assumed in this analysis [see the new town report included at the back of this volume for additional information].)

The definition of the impact area was refined through an iterative process. For the purposes of the input/output model, a two-county study region was defined initially (San Juan and McKinley counties). As the analysis progressed, it became apparent that most of the impacts on community facilities and services would be felt in the greater Farmington area. Thus, the study area delineated for detailed impact analysis is the part of San Juan County that contains

Farmington, Aztec, Bloomfield, and the unincorporated communities of Flora Vista, Lee Acres, and the Lower Valley (Waterflow, Fruitland, and Kirtland).

The communities of Shiprock, Crownpoint, and Thoreau were examined and excluded from this detailed analysis when preliminary analyses indicated that project-related impacts on their infrastructure and services would be negligible. Although residents of Shiprock, Crownpoint, or Thoreau could obtain project-related employment (see Apendix D for analysis of potential Navajo employment), the analysis did not support the assumption that new workers would choose to move to those communities. (As stated above, the in-migration of new residents is the greatest impacting agent at the community level.) Thoreau is much farther from the proposed plant site and offers fewer amenities than communities in the Farmington area. In Crownpoint, and especially in Shiprock, jurisdictional constraints generally keep non-Native Americans out of these communities; furthermore, the supply of housing available to new Navajo residents is very limited. Ownership constraints and jurisdictional barriers to leasing land outside a Navajo's home chapter make buying land for a new home difficult. Even if a lease were to be secured, conventional financing is difficult to obtain to build a home on land not owned by the individual.

While there is some evidence that Navajo workers may temporarily relocate with relatives or clan members while employed in a particular area, the extent of this type of migration has not been documented and could not be assessed. Furthermore, there is no evidence that the proposed action would even draw upon Navajo workers from outside the study region. Finally, Shiprock apparently felt no impacts to infrastructure and services from construction and operation of either the San Juan Generating Station or the Four Corners Power Plant, both of which are much closer to Shiprock (within 15 miles) than the proposed action would be.

INDICATORS OF SIGNIFICANCE

The purpose of this EIS/analysis is not only to identify potential project-related impacts but also to determine which impacts would be considered significant (either beneficial or adverse). In order to meet the second objective, a series of threshold indicators were defined to identify potentially significant socioeconomic impacts. These were based on the current availability and condition of facilities and services in the study area, experience with in-migration in the affected area, and professional judgments of the analysts involved.

Project-related impacts that are identified as exceeding the following indicators were considered significant:

- Projected annual population change in existing communities exceeding 10 percent
- 10 percent increase in county or community annual net revenues
- Inability of public-sector jurisdictions to meet costs of providing necessary services and facilities to new population prior to receipt of project-related revenues
- Demand for community services and facilities (housing, municipal services, education, human services, health services, law enforcement, fire protection, and recreation) in excess of projected availability
- Inability of the local private sector to respond to new demands for services and facilities not supplied by the public sector

These indicators are referred to in the Section 4.0 analysis of potential project impacts in order to establish an estimate of the level of significance associated with the specific impacts identified. The indicators were developed on the basis of previous EIS analyses and in conjunction with BLM's social and economic planning system.

INFORMATION SOURCES

The majority of the information synthesized in this report was obtained through primary and secondary sources. Information on the proposed action, which included the number of construction and operation workers by year and by project component, was provided by PNM. (Table 1-1 shows the work-force data used in the assessment of the socioeconomic impacts of the proposed action. Those data represent PNM's most current and precise estimate of work-force levels and timing that were available at the time of analysis.) Information concerning projects included in Baseline 1 was obtained through published sources and verified or supplemented through primary contacts.

The information contained in sections 3.0 and 4.0 of this report (the description and analysis of the existing and projected socioeconomic environment) is based almost exclusively on work performed by Adcock and Associates, Inc., under contract to WCC. In general, federal and state agencies provided information on demographic and economic (employment and income) characteristics (including information specific to Native Americans), transportation, and welfare assistance; while regional, county, and local planning agencies were the primary sources for data on community finances, housing, and services and facilities.

3.0

AFFECTED ENVIRONMENT

OVERVIEW

The objective of Section 3.0 is (1) to describe the current social and economic environment of the study area (e.g., the greater Farmington area), and (2) to project future conditions of the study area's social and economic characteristics in the absence of the proposed action. In addition, information on historical trends is presented when useful in interpreting the current situation and in projecting future conditions. The projections encompass the projected existing environment described in Baseline 1 (see Appendix C of the EIS for a complete list of those projects and their location). The methods used to project future population, employment, residence of in-migrating workers, and fiscal conditions are described in Appendices A, B, and C.

The following characteristics of the social and economic environment are included: population, economy and employment, personal income, public finance, housing, municipal services, education, health services, human services, law enforcement, fire protection, and community recreation.

History[1]

The original inhabitants of the San Juan Basin were Native Americans (including the Navajos and numerous Puebloan groups) whose subsistence was based initially on hunting and gathering, and later on subsistence agriculture. During the late sixteenth century Spanish expeditions entered the area in search of gold, silver, and other wealth. Spanish settlers established missions, and introduced sheep, cattle and goats to Native Americans. Hence, livestock production became an important addition to agriculture in the regional economy.

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[1] For a detailed description of the affected region's prehistory and history, see the Cultural Resources Technical Report.

During the seventeenth and eighteenth centuries, more settlers from Spain and Mexico established residence in the San Juan Basin. In the eighteenth century Anglo trappers, miners, and merchants also in-migrated to the region. This influx of settlers created some tensions, and Native Americans, especially the Navajos, began raiding Anglo and Hispanic villages. The U.S. military retaliated and tried to force an end to the raids. As part of this policy, the Navajos were removed to Fort Sumner in 1863. There they were to be taught farming and other elements of a settled lifestyle. The Fort Sumner experiment failed; in 1868, the remaining Navajos were released to return to their newly established reservation lands.

In the late nineteenth century, more Anglo settlers were attracted to the rich agricultural lands in the Farmington area. The construction of railroads and start of coal mining activity in the 1880s stimulated further in-migration of non-Native Americans. In the early to mid 1900s the area maintained its predominantly agrarian economy. Following World War II, however, increasing numbers of Anglos migrated to New Mexico, attracted by the dry, sunny climate, energy resources, and the government defense industry. The development of oil, gas, and uranium in the San Juan Basin, beginning in the 1950s, became a key factor influencing subsequent population growth and economic change in northwestern New Mexico. At the same time, small-scale ranching and farming activities became less profitable.

Recent Trends

Northwestern New Mexico has maintained its multicultural character. Three broad ethnic groups (Hispanics, Anglos, and Native Americans) predominate, although the relative proportions of these groups have shifted over time. In northern San Juan County, Farmington is the commercial and retail center. It has the largest population, as well as a broad range of services which residents of Aztec, Bloomfield, unincorporated cummunities, and the Navajo Reservation utilize heavily. Farmington has experienced a number of economic boom periods, during which Anglos would migrate to the area in large numbers, reducing the relative proportions of Hispanics and Native Americans in the regional population. Historically, these booms have sometimes been followed by periods of slow growth or economic downturn, with Anglos out-migrating to seek opportunities elsewhere.

POPULATION

Table 3-1 summarizes population changes for San Juan County, the cities of Farmington, Aztec, and Bloomfield, the communities of Flora Vista and Lee Acres, and the Lower Valley from 1910 through 1980. Between 1950 and 1960 the population of San Juan County rose from 18,292 to 53,306, an increase of 191 percent. During this same period, Farmington also experienced a rapid increase in population (growing from 3637 persons in 1950 to 23,786 in 1960) due principally to developments in the oil and gas industry. By 1960, growth had been stabilized and between 1960 and 1970 both San Juan County and Farmington experienced a population loss.

The relatively high birth rate of the Navajos in combination with improved medical care and reduced infant mortality rates resulted in an above-average rate of Navajo population increase. By 1970, Native

Table 3-1. POPULATION CHANGE, SAN JUAN COUNTY AND STUDY AREA COMMUNITIES: 1910-1980

Area	1910	1920	1930	1940	1950	1960	1970	1980
San Juan County								
Population	8,504	8,333	14,701	17,115	18,292	53,306	52,517	81,433
Percent Change*	N/A	(2)	76	16	7	191	(1)	55
Farmington								
Population	785	728	1,350	2,161	3,637	23,786	21,979	31,222
Percent Change*	N/A	(7)	85	60	68	554	(8)	42
Aztec								
Population	509	489	740	756	885	4,137	3,354	5,512
Percent Change*	N/A	(4)	51	2	17	367	(19)	64
Bloomfield								
Population	--	--	--	--	--	1,292	1,574	4,881
Percent Change*	--	--	--	--	--	N/A	22	210
Flora Vista								
Population	--	--	--	--	--	--	--	3,834
Percent Change*	--	--	--	--	--	--	--	N/A
Lee Acres								
Population	--	--	--	--	--	--	--	4,677
Percent Change*	--	--	--	--	--	--	--	N/A
Lower Valley								
Population	--	--	--	--	--	--	--	4,736
Percent Change*	--	--	--	--	--	--	--	N/A

Source: Adapted from Adcock and Associates, Inc., 1982.

Note: N/A = not applicable.
Parentheses indicate a negative change.

*Percent change computed from previous 10-year figure.

Americans (principally Navajos) constituted 35 percent of the total population of San Juan County, while Anglos represented just over 50 percent. (Hispanics accounted for 8.7 percent the total county population; Blacks represented less than 1 percent.)

Between 1970 and 1980, northwestern New Mexico once again experienced substantial growth exhibited by a 55.1 percent increase in San Juan County. This growth generally resulted from two interrelated factors: (1) in-migration in response to energy resource (primarily oil and gas) development, and (2) a continued high rate of natural increase among Native Americans.

The development of energy resources in San Juan County proceeded rapidly, particularly in the early to mid 1970s. The increasing emphasis on oil and gas exploration and the expansion of coal mining made significant contributions to the area's overall population growth. In addition, San Juan County experienced increased construction activity in industries related to natural resource development, including the building of San Juan Generating Station and major additions to the Four Corners Power Plant, both of which are located west of Farmington.

Data for Native Americans show a 40 percent increase in the group's total population between 1970 and 1980. While some of this growth may be attributable to migration and to possible undercounts in the 1970 census, natural increase accounts for the group's major share of growth.

A significant proportion of the non-Navajo population that resided in San Juan County are recent in-migrants who moved to the area in response to energy development. (A 1979 survey conducted in the San Juan County area shows that approximately one-third of the residents of Farmington, Aztec, Bloomfield, and the surrounding non-reservation area have resided within that area for 7 years or less [Adcock 1980].) Because of this migration, the balance between the Native American and non-Native American populations remained stable (with approximately one-third of the total population being Native American) between 1970 and 1980, even though the natural increase for the Native American populations was substantially greater than that of the non-Native American population.

In 1980, approximately 34,000 Native Americans lived on the parts of the Navajo and Zuni reservations contained within San Juan and McKinley counties. Of this total, about 19,900 (or 31.6 percent) resided in the checkerboard area adjacent to the Navajo Reservation; the remainder were scattered throughout the rural portion of the Reservation and in communities such as Shiprock. The majority of both the Anglo and Hispanic populations (89.9 and 94.2 percent respectively) lived in the cities of Farmington, Aztec, Bloomfield, Gallup, and Thoreau and in the river valley areas of San Juan County. Only about 2 percent of the total two-county area's Anglo population lived on Native American reservations. (The 1980 racial and ethnic population distribution for San Juan County and the study area communities is shown in Table 3-2.)

Table 3-3 contains annual population projections without the proposed action (Baseline 1) for San Juan County and the study area communities from 1980 through the year 2000. (See Appendix A for a description of the population projection methodology.) Between 1980 and 1990, San Juan County is estimated to experience a compound annual growth rate of approximately 2.4 percent. Total population is projected to decrease slightly after 1990, stabilize by 1993, and grow at an annual rate of approximately 1.2 percent between 1993 and 2000. Therefore, without the proposed action, San Juan County's population

Table 3-2. RACIAL AND ETHNIC POPULATION DISTRIBUTION, SAN JUAN COUNTY AND STUDY AREA COMMUNITIES: 1980

Area	Percent Distribution White	Black	Indian	Other[a]	Spanish Origin[b]
San Juan County	60.5	0.4	33.1	6.0	11.8
Farmington	82.3	0.8	8.5	8.4	14.4
Aztec	84.6	0.1	7.1	8.2	16.6
Bloomfield	79.3	0.0	8.1	12.6	23.4
Flora Vista	88.7	0.3	3.2	7.9	14.9
Lee Acres	89.4	0.4	3.2	7.1	15.0
Lower Valley	77.0	---	17.9	5.1	7.7

Source: Adcock and Associates Inc. 1982.

[a] In the 1980 census, approximately 6.5 percent of the respondents listed their racial category as "other." It is estimated that many of those individuals were of mixed parentage--i.e., Native American, Caucasian, and/or Hispanic. Consequently, the number of Native Americans and Hispanics could be larger than indicated.

[b] Multiracial Group.

Table 3-3. POPULATION PROJECTIONS WITHOUT PROPOSED ACTION (BASELINE 1), SAN JUAN COUNTY AND STUDY AREA COMMUNITIES: 1980-2000

	San Juan County	Farmington	Aztec	Bloomfield	Flora Vista	Lee Acres	Lower Valley
1980*	81,433	31,222	5,512	4,881	3,834	4,677	4,736
1981	85,900	33,150	5,000	5,100	4,000	4,850	5,400
1982	89,000	34,950	6,000	5,450	4,150	5,050	5,400
1983	89,000	35,250	6,050	5,250	4,200	5,050	5,000
1984	90,200	36,050	6,150	5,500	4,250	5,150	5,200
1985	93,700	38,000	6,350	5,750	4,400	5,350	5,800
1986	95,300	39,050	6,550	5,700	4,500	5,450	5,550
1987	97,200	40,250	6,650	5,950	4,600	5,550	5,650
1988	98,900	41,300	6,750	6,050	4,650	5,650	5,750
1989	101,400	42,800	7,000	6,400	4,800	5 800	5,900
1990	103,600	44,250	7,250	6,350	4,950	5,950	6,000
1991	102,600	43,450	6,900	6,300	4,750	5,800	6,000
1992	103,800	44,000	7,100	6,350	4,850	5,900	6,000
1993	103,700	43,750	6,950	6,450	4,800	5,900	6,000
1994	104,700	44,300	7,150	6,300	4,950	5,950	6,100
1995	106,200	44,800	7,250	6,500	5,000	6,050	6,150
1996	107,500	45,150	7,300	6,550	5,050	6,150	6,250
1997	109,100	45,750	7,400	6,800	5,100	6,250	6,300
1998	110,100	46,300	7,450	6,550	5,200	6,250	6,400
1999	111,400	46,800	7,450	6,750	5,250	6,350	6,450
2000	112,700	47,350	7,550	6,850	5,300	6,450	6,550

Sources: Adcock and Associates, Inc. 1982.

*Census data.

is estimated to increase from the 1980 level of 81,433 to 112,700 by the year 2000. Between 1990 and 2000, the rate of growth in Farmington, Aztec, Bloomfield, and unincorporated areas in San Juan County is projected to be less than in the previous decade, with compound annual growth rates ranging from 0.4 percent in 1990 to 0.9 percent in 2000 (compared to 2.7 percent in 1980 and 3.5 percent in 1990). Between 1980 and 2000, Farmington's population is estimated to rise from 31,222 to 47,350, or approximately 50 percent.

ECONOMY AND EMPLOYMENT

As shown in Table 3-4, between 1970 and 1980, the major sources of employment in San Juan County were services, wholesale and retail trade, and government. The majority of those jobs were located in the greater Farmington area. During this period, total county employment increased by more than 17,800 jobs, from 13,728 in 1970 to 31,603 in 1980. This represented a growth of 130 percent. The largest increases in the number of jobs were exhibited by the county's largest employment sectors: services and miscellaneous (4,106), contract construction (3,728), wholesale and retail trade (3,120), and mining (2,973).

Table 3-5 summarizes trends in labor force, employment, and unemployment from 1970 to 1980 in San Juan County and New Mexico. During this period, the labor force in San Juan County grew from 16,713 to 35,022, which represented an overall increase of 110 percent (and a 7.7 percent compound annual growth rate) compared to a 54.8 percent increase for the state as a whole.

In general, while the total number of people employed in the county increased between 1970 and 1975, the unemployment rate fluctuated between 12.2 and 10.7 percent. (On the average, these

Table 3-4. NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT, SAN JUAN COUNTY: 1970-1980

Industrial Sector	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
San Juan County											
Nonagricultural Wage & Salary	13,728	14,897	16,260	17,775	18,938	20,889	22,191	27,078	30,690	30,365	31,603
Manufacturing	1,433	1,319	1,288	1,754	1,603	923	925	1,137	1,469	1,457	1,325
Mining*	1,303	1,410	1,511	1,803	2,057	2,304	2,156	2,555	2,989	3,306	4,276
Contract Construction	1,205	1,669	1,974	1,943	2,488	2,870	3,289	4,676	4,820	4,219	4,933
Transportation & Public Utilities	1,858	1,875	1,914	2,015	2,185	2,326	2,530	2,815	3,230	3,550	3,652
Wholesale & Retail Trade	2,621	2,889	3,175	3,596	3,833	4,353	4,666	5,269	5,621	5,718	5,741
Finance, Insurance & Real Estate	340	366	403	438	528	582	667	724	785	826	831
Services & Miscellaneous	1,925	2,183	2,665	2,787	2,663	3,856	4,159	5,735	7,318	6,629	6,031
Government	3,043	3,186	3,330	3,439	3,581	3,675	3,799	4,167	4,458	4,660	4,814

Source: Adcock and Associates, Inc., 1982.

Data Sources: New Mexico Employment Security Department, Research and Statistics Section. Table B, Labor Information Series, 1970 through 1980.

*Includes oil and gas employment.

Table 3-5. LABOR FORCE CHARACTERISTICS, NEW MEXICO AND SAN JUAN COUNTY: 1970-1980

Labor Force Characteristics	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
New Mexico											
Labor Force	350,188	366,851	385,231	404,191	423,558	444,295	466,000	504,000	526,000	537,000	542,000
Percent Change	-	4.8	5.0	4.9	4.8	4.9	4.9	8.2	4.4	2.1	0.9
Employment	323,223	336,857	356,497	374,459	388,604	399,717	423,000	465,000	496,000	502,000	502,000
Percent Change	-	4.2	5.8	5.0	3.8	2.9	5.8	9.9	6.7	1.2	0.0
Unemployment	26,965	29,994	28,734	29,732	34,604	44,378	43,000	39,000	30,000	35,000	40,000
Percent Change	-	11.2	(4.2)	3.5	16.4	28.8	(3.5)	(9.3)	(23.1)	16.7	14.3
Unemployment Rate (%)	7.7	8.2	7.5	7.4	8.2	10.0	9.2	7.8	5.8	6.6	7.4
San Juan County											
Labor Force	16,713	17,895	19,275	20,842	22,145	24,694	25,879	31,247	34,917	34,422	35,022
Percent Change	-	7.1	7.7	8.1	6.3	11.5	4.8	20.7	11.7	(1.4)	1.7
Employment	14,757	15,924	17,155	18,622	19,780	21,682	23,225	28,916	32,669	31,638	32,303
Percent Change	-	7.9	7.7	8.6	6.2	9.6	7.1	24.5	13.0	(3.2)	2.1
Unemployment	1,956	1,970	2,120	2,220	2,365	3,012	2,654	2,331	2,248	2,784	2,719
Percent Change	-	0.7	7.6	4.7	6.5	24.4	(11.9)	(12.2)	(3.6)	23.8	(2.3)
Unemployment Rate (%)	11.7	11.0	11.0	10.7	10.7	12.2	10.3	7.5	6.4	8.1	7.8

Source: Adcock and Associates, Inc., 1982.

Data Sources: New Mexico Employment Security Department, Research and Statistics Section. Table A, Civilian Labor Force, Employment, Unemployment, and Unemployment Rate, 1970-1980.

Note: Parentheses indicate a negative change.

rates were 3.2 percent higher than the rates for New Mexico.) Following the 1975 recession, both the state and county unemployment rates decreased. In San Juan County, this coincided with regional increases in energy resource development. However, by the end of the 1970s and early 1980s, the unemployment rates began increasing once again in response to downturns in the national economy and to decreases in energy-related exploration and development.

Over the next 20 years, the San Juan County economy is likely to continue to be dependent upon energy development. It is anticipated that much of the county's economic growth during this period would result from the expansion of coal mining and from the construction and operation of power plants and associated coal-haul railroads.

PERSONAL INCOME

In 1979, personal income for the construction, transportation and public utilities, government and governmental entities, and retail trade sectors accounted for over 50 percent of the total labor and proprietors' income derived in San Juan County (see Table 3-6). Per capita personal income for the county in 1975 ($7,575) was slightly above the statewide average of $7,482.

PUBLIC FINANCES

Farmington

During fiscal year (FY) 1981, the City of Farmington's total revenues were nearly $74.2 million with $14.2 million in operating funds, $28.4 million in enterprise funds, and $31.6 million in capital funds. During the same period municipal expenditures approached $51.4 million: $13.5 million in operating funds, $23.4 million in enterprise funds, and nearly $14.5 million in capital funds (see

Table 3-6. PERSONAL INCOME, NEW MEXICO AND SAN JUAN COUNTY: 1979 (thousands of dollars)

Item	New Mexico^a	Percent Distribution^b	San Juan County^a	Percent Distribution^b
Total Labor and Proprietors' Income by Place of Work^c				
By Type				
Wage & Salary Disbursements	5,834,395	82.7	432,705	83.8
Other Labor Income	536,885	7.6	49,282	9.5
Proprietors' Income^d	681,204	9.7	34,150	6.6
Farm	190,975	2.7	1,995	0.4
Nonfarm	490,229	7.0	32,155	6.2
By Industry				
Farm	271,416	3.8	3,158	0.6
Nonfarm	6,781,068	96.2	512,979	99.4
Private	4,969,335	70.5	454,728	88.1
Agric. Services^e	23,517	0.3	375	0.1
Mining	666,639	9.5	(D)	-
Construction	564,932	8.0	91,310	17.7
Manufacturing	506,661	7.2	27,732	5.4
Nondurable Goods	184,561	2.6	17,968	3.5
Durable Goods	322,100	4.6	9,764	1.9
Transportation & Public Utilities	585,128	8.3	80,935	15.7
Wholesale Trade	348,112	4.9	17,898	3.5
Retail Trade	778,937	11.0	48,651	9.4
Finance, Insurance, & Real Estate	305,198	4.3	11,900	2.3
Services	1,190,211	16.9	(D)	-
Government & Government Enterprises	1,811,733	25.7	58,251	11.3
Federal, Civilian	518,167	7.3	20,659	4.0
Federal, Military	219,270	3.1	1,041	0.2
State & Local	1,074,296	15.2	36,551	7.1

Table 3-6. PERSONAL INCOME, NEW MEXICO AND SAN JUAN COUNTY: 1979 (thousands of dollars) (concluded)

Item	New Mexico[a]	Percent Distribution[b]	San Juan County[a]	Percent Distribution[b]
Derivation of Personal Income by Place of Residence				
Total Labor & Proprietors' Income by Place of Work	7,052,484	100.0	516,317	100.0
Less: Personal Contributions for Social Insurance by Place of Work	382,415	5.4	29,241	5.7
Net Labor & Proprietor's Income by Place of Work	6,670,069	94.6	486,896	94.3
Plus: Residence Adjustment	-28,198	-0.4	-7,094	-1.4
Net Labor & Proprietor's Income by Place of Residence[f]	6,641,871	94.2	479,802	93.0
Plus: Dividends, Interest, & Rent[f]	1,352,176	N/A	51,628	N/A
Plus: Transfer Payments	1,293,029	N/A	63,236	N/A
Personal Income by Place of Residence	9,287,016	N/A	594,666	N/A
Per Capita Personal Income	7,482	N/A	7,575	N/A

Source: Adcock and Associates, Inc., 1982.

Data Source: Computer Printout, Regional Economics Information System, Bureau of Economic Analysis, U.S. Department of Commerce, April 1981.

Note: N/A = not applicable. (D) = disclosure would reveal confidential information.

[a] Estimates based on 1972 Standard Industrial Classification (SIC).

[b] Percent distribution based on "Total Labor and Proprietors' Income by Place of Work."

[c] Consists of wage and salary disbursements; other labor income, and proprietors' income. Primary source for private nonfarm wages: ES-202 Covered Wages, New Mexico Employment Security Commission.

[d] Includes the capital consumption adjustment for nonfarm proprietors.

[e] Includes wages and salaries of U.S. residents working for international organizations in the U.S.

[f] Includes the capital consumption adjustment for rental income of persons.

Tables 3-8 and 3-9). Thus, Farmington experienced moderate surpluses in both operating and enterprise fund categories. In addition, there was an excess of capital funds receipts over expenditures resulting primarily from the sale of $23.6 million in bonds. (This surplus, however, would be spent over the next 2 years as the revenues are used to fund the remaining capital projects initiated in FY 1981.)

In FY 1981, the most significant source of revenues to the general fund was the Gross Receipts tax. (This broad-based tax was levied on 4.5 percent of gross receipts of all businesses. This tax consisted of a 0.75 percent local tax and a 3.75 percent state tax. The state returned part of the state tax to the community, resulting in total local Gross Receipts tax revenues of 1.75 percent of local gross receipts.) From Table 3-8 it can be seen that Gross Receipts taxes contributed $9.5 million or 67 percent of total operating revenues. The Gross Receipts tax also contributed $1.6 million to capital funds revenues. The largest expenditure category for operating funds was public safety (36.1 percent), followed by public works (20.1 percent), general government (17.8 percent), recreation and culture (12.5 percent), debt service (12.5 percent), and health and welfare (1.1 percent).

Between FY 1981 and FY 2000, it is estimated that without the proposed action Farmington would experience substantial annual surpluses in the General Fund (see Table 3-10). However, expenditures are expected to grow faster than revenues during the 1980s, then level out in the 1990s. Farmington's overall operating funds are expected to vary over the next 20 years, showing a deficit in all years through FY 1993 except FY 1985. Surpluses are projected for FY 1994 and all subsequent years through FY 2000. The surplus is projected to be $410,000 in FY 2000.

Table 3-8. FARMINGTON REVENUES FOR FISCAL YEAR 1981 (all budgeted funds - 1980 dollars)

	Operating Funds		Enterprise Funds			
Revenue Source	General	Other[a]	Utilities[b]	Other[c]	Capital Funds	Total
Own Source	5,171,043	1,191,552	26,643,359	1,785,698	26,914,757	61,706,409
Taxes	3,864,586	139,732			1,585,886	5,590,204
Property	219,717	107,628				327,345
Franchise	209,424					209,424
Occupation	167,360					167,360
Lodgers	96,312	32,104				128,416
Gross Receipts	3,171,773				1,585,886	4,757,659
Charges & Misc.	1,306,457	1,051,820	26,643,359	1,785,698	23,328,871	56,116,205
Licenses & Permits	214,587					214,587
Charges for Services	69,379		23,461,478	1,279,881		24,810,738
Fines & Forfeits	336,106					336,106
Interest on Invest.	246,922	116,795	378,678	9,601	1,138,007	1,890,003
Miscellaneous	439,463	935,025	2,803,203	496,216	24,190,864[d]	28,864,771[d]
Intergovernmental Transfers	7,079,909	746,324			4,656,916	12,483,149
Grants	25,701	670,008			4,656,916	5,352,625
Federal	8,500	594,956			1,843,255	2,446,711
State	17,201	75,052			2,813,661	2,905,914
County						-0-
State Shared Revenues	7,054,208	76,316				7,130,524
Gasoline Tax	443,669					443,669
Auto License	147,462					147,462
Cigarette Tax	119,532	76,316				195,848
Gross Receipts Tax	6,343,545					6,343,545
Gross Revenues	12,250,952	1,937,876	26,643,359	1,785,698	31,571,673	74,189,558
Transfers to (from)	179,660	934,373	60,650	(179,634)	(995,049)	-0-
Net Revenues	12,430,612	2,872,249	26,704,009	1,606,064	30,576,624	74,189,558

Source: Adcock and Associates, Inc. 1982.

Data Source: Farmington Municipal Quarterly Report for period ending June 30, 1981.

[a] Recreation, library gifts, lodgers' tax, civic center revolving, state health systems, combined inventory, refundable deposits, M.E.G.A., revenue sharing, state fire fund, state library grant, senior citizens, general obligation bonds, sales tax debt service, municipal tax debt service, special A.D. bonds.

[b] Electric, water, sewer (EWS) utility operations, EWS inventory, refundable EWS deposits, EWS debt service.

[c] Sanitation, airport, sanitation debt service, airport debt service.

[d] Includes $23,584,160 in bond sales proceeds.

Table 3-9. FARMINGTON EXPENDITURES FOR FISCAL YEAR 1981 (all budgeted funds - 1980 dollars)

	Operating Funds		Enterprise Funds			
Revenue Source	General	Other[a]	Utilities[b]	Other[c]	Capital Funds	Total
General Government	1,931,630	469,211				2,400,841
Personal Services	930,806	29,609				960,415
Operating Expense	784,033	2,707				786,740
Capital Outlay	63,590					63,590
Other	153,201	436,895				590,096
Public Safety	4,679,610	197,496				4,877,106
Personal Services	4,050,427					4,050,427
Operating Expense	521,902					521,902
Capital Outlay	23,899	197,496				221,395
Other	83,382					83,382
Public Works	2,359,672	353,020	20,131,718	984,564	14,208,826	38,127,800
Personal Services	1,601,123		3,805,200	494,604		5,900,927
Operating Expense	606,775		2,781,764	371,407	1,105,677	4,865,623
Capital Outlay	120,104	176,178	3,532,224	34,530	13,193,149	17,056,185
Other	31,670	176,842	10,012,530	84,023		10,305,065
Health and Welfare	136,247	11,543				147,790
Personal Services	117,121					117,121
Operating Expense	19,126	7,868				26,994
Capital Outlay		3,675				3,675
Other						
Recreation and Culture	1,650,542	39,222			168,616	1,858,380
Personal Services	1,026,656					1,026,656
Operating Expense	458,082	17,437			2,299	477,818
Capital Outlay	62,814	20,987			166,317	250,118
Other	102,990	798				103,788
Debt Service		1,688,666	2,085,917	203,232		3,977,815
General Obligation Bonds		154,880				154,880
Revenue Bonds		1,533,786	2,085,917	203,232		3,822,935
Total	10,757,701	2,759,158	22,217,635	1,187,796	14,467,442	51,389,732

Source: Adcock and Associates, Inc. 1982.

Data Source: Farmington Municipal Quarterly Report for period ending June 30, 1981.

[a] Recreation, library gifts, lodgers' tax, civic center revolving, state health systems, combined inventory, refundable deposits, M.E.G.A., revenue sharing, state fire fund, state library grant, senior citizens, general obligation bonds, sales tax debt service, municipal tax debt service, special A.D. bonds.

[b] Electric, water, sewer (EWS) utility operations, EWS inventory, refundable EWS deposits, EWS debt service.

[c] Sanitation, airport, sanitation debt service, airport debt service.

Table 3-10. FARMINGTON OPERATING FUNDS, PROJECTIONS WITHOUT PROPOSED ACTION (BASELINE 1): 1985 - 2000 (thousands of constant 1980 dollars)

General Fund	1981[a]	1985	1990	1995	2000
Revenues					
Taxes	3,864	4,230	4,720	4,860	5,160
Charges and Miscellaneous	1,306	1,370	1,460	1,310	1,390
Grants	26	30	40	40	40
State Shared	7,054	7,710	8,600	8,850	9,400
Total Revenues	12,251	13,340	14,810	15,060	15,980
Expenditures					
General Government	1,932	2,200	2,560	2,620	2,780
Public Safety	4,680	5,320	6,220	6,370	6,730
Public Works	2,360	2,680	3,160	3,270	3,460
Health and Welfare	136	160	180	190	200
Recreation and Culture	1,650	1,890	2,220	2,270	2,400
Total Expenditures	10,758	12,240	14,340	14,720	15,560
Surplus or Deficit[b]	1,493	1,100	470	330	410
Other Operating Funds					
Revenues	1,938	1,190	1,390	1,460	1,540
Expenditures	2,759	2,150	2,060	1,460	1,550
Surplus or Deficits	(821)	(962)	(670)	0	(10)
All Operating Funds					
Revenues	14,189	14,530	16,200	16,520	17,520
Expenditures	13,517	14,390	16,400	16,190	17,110
Surplus or Deficit	—	140	(200)	330	410
Surplus or Deficit with Interest[c]	672	550	370	1,190	2,020

Source: Adcock and Associates, Inc. 1981.

Detail may not equal total because of rounding.

[a] Actual.

[b] Deficits are shown in parentheses.

[c] Interest compounded on projected surplus or deficit at 10 percent.

Aztec

In general, the City of Aztec experienced a net surplus of total revenues and expenditures during FY 1981. Municipal revenues were $3.4 million with $1.2 million in operating funds, $1.6 million in enterprise funds, and $0.6 million in capital funds (see Table 3-11). Expenditures for the same period were $3.2 million, with $1.1 million in operating funds, $1.4 million in enterprise funds, and $0.7 million in capital funds (see Table 3-12).

Gross Receipts taxes contributed over half of the revenues to operating funds, while $259,000 came from charges and miscellaneous sources. The remaining $307,000 consisted of other taxes and transfers. About half of the revenues to the capital funds resulted from the sale of bonds totaling $310,000.

A significant part of the city's operating expenses in FY 1981 went to public safety (30 percent) and general government (32 percent). Debt service amounted to $124,000. Most of the enterprise funds budget was spent on operation activities ($905,000 on operating expenses and $374,000 on personal services), while $661,000 was spent on construction projects.

It is anticipated that, without the proposed action, the surplus in the General Fund would continue through FY 2000 (see Table 3-13). While other operating funds are projected to show deficits through FY 1990 and surpluses thereafter, overall operating funds in Aztec are projected to have revenues in excess of expenditures throughout the year 2000.

Bloomfield

The City of Bloomfield experienced a deficit of $62,000 in FY 1980-81; municipal revenues were $1.75 million and expenditures were

Table 3-11. AZTEC REVENUES FOR FISCAL YEAR 1981 (all budgeted funds - 1980 dollars)

Revenue Source	Operating Funds		Enterprise Funds		Capital Funds	Total
	General	Other[a]	Utilities[b]	Other[c]		
Own Source	478,350	174,529	1,414,914	167,379	361,728	2,596,900
Taxes	359,383	34,312				393,695
Property	18,509	34,312				52,821
Franchise	47,192					47,192
Occupation	11,349					11,349
Lodgers						0
Gross Receipts	282,333					282,333
Charges & Misc.	118,967	140,217	1,414,914	167,379	361,728	2,203,205
Licenses & Permits	10,105					10,105
Charges for Services	17,964		1,325,588	147,676		1,491,228
Fines & Forfeits	45,560					45,560
Interest on Invest.	22,645	14,513	34,740		16,881	88,779
Miscellaneous	22,693	125,704	54,586	19,703	344,847[d]	567,533[d]
Intergovernmental Transfers	484,023	107,414			256,748	848,185
Grants	5,340	99,027			256,748	361,115
Federal	4,340	45,076			63,756	113,172
State	1,000	48,951			192,992	242,943
County		5,000				5,000
State Shared Revenues	478,683	8,387				487,070
Gasoline Tax	52,987					52,987
Auto License	12,919					12,919
Cigarette Tax	16,775	8,387				25,162
Gross Receipts Tax	396,002					396,002
Gross Revenues	962,373	281,943	1,414,914	167,379	618,476	3,445,085
Transfers to (From)	(56,630)	62,820	(164,672)	163,901	(5,419)	0
Net Revenues	905,743	344,763	1,250,242	331,280	613,057	3,445,085

Source: Adcock and Associates, Inc. 1982.

Data Sources: Aztec Municipal Quarterly Report for period ending June 30, 1981, and Detail Accounting of Transfers.

[a] Fire protection, recreation, revenue sharing, shop interservice, senior citizens grant, M.E.G.A., 1978 sales tax bond, 1979 sales tax bond, 1980 G.O. bond.

[b] Joint utility, meter deposit, water rights, N.M.E.R.I., 1962 joint utility bond, 1975 water improvement bond, 1976 water improvement bond.

[c] Solid waste disposal, airport, 1977 sanitation bond.

[d] Includes $310,000 in bond sales proceeds.

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Table 3-12. AZTEC EXPENDITURES FOR FISCAL YEAR 1981 (all budgeted funds - 1980 dollars)

	Operating Funds		Enterprise Funds			
Revenue Source	General	Other[a]	Utilities[b]	Other[c]	Capital Funds	Total
General Government	201,791	164,969				366,760
Personal Services	116,352	45,952				162,304
Operating Expense	85,269	118,417				203,686
Capital Outlay	170	600				770
Other						0
Public Safety	326,157	20,320				346,477
Personal Services	262,471					262,471
Operating Expense	59,944	3,354				63,298
Capital Outlay	3,742	7,270				11,012
Other		9,696				9,696
Public Works	139,917	4,622	1,156,520	126,439	625,043	2,052,541
Personal Services	76,379		317,184	57,363	13,930	464,856
Operating Expense	62,288	4,622	835,938	69,076	62,000	1,033,924
Capital Outlay	1,250		3,398		549,113	553,761
Other						0
Health and Welfare	11,665	26,144				37,809
Personal Services	9,728	19,503				29,231
Operating Expense	1,937	6,641				8,578
Capital Outlay						0
Other						0
Recreation and Culture	107,463	5,010			35,683	148,156
Personal Services	68,437	2,464				70,901
Operating Expense	38,056	2,546				40,602
Capital Outlay	718				35,683	36,401
Other	252					252
Debt Service		123,904	126,820	43,400		294,124
General Obligation Bonds		12,264				12,264
Revenue Bonds		111,640	126,820	43,400		281,860
Total	786,993	344,969	1,283,340	169,839	660,726	3,245,867

Source: Adcock and Associates, Inc. 1982.

Data Sources: Aztec Municipal Quarterly Report for period ending June 30, 1981, and Detail Accounting of Transfers.

[a] Fire protection, recreation, revenue sharing, shop interservice, senior citizens grant, M.E.G.A., 1978 sales tax bond, 1979 sales tax bond, 1980 G.O. bond.

[b] Joint utility, meter deposit, water rights, N.M.E.R.I., 1962 joint utility bond, 1975 water improvement bond, 1976 water improvement bond.

[c] Solid waste disposal, airport, 1977 sanitation bond.

Table 3-13. AZTEC OPERATING FUNDS, PROJECTIONS WITHOUT PROPOSED ACTION (Baseline 1): 1985 - 2000 (thousands of constant 1980 dollars)

General Fund	1981[a]	1985	1990	1995	2000
Revenues					
Taxes	359	400	440	450	480
Charges and Miscellaneous	119	110	120	120	120
Grants	5	10	10	10	10
State Shared	479	520	590	600	630
Total Revenues	962	1030	1160	1180	1240
Expenditures					
General Government	202	220	250	260	270
Public Safety	326	360	410	420	430
Public Works	140	160	180	180	190
Health and Welfare	12	10	10	10	20
Recreation and Culture	107	120	140	140	140
Total Expenditures	787	870	990	1010	1050
Surplus or Deficit	175	160	170	170	190
Other Operating Funds					
Revenues	282	300	340	350	370
Expenditures	345	380	400	350	300
Surplus or Deficit[b]	(63)	(80)	(60)	0	70
All Operating Funds					
Revenues	1244	1340	1500	1530	1610
Expenditures	1132	1260	1390	1350	1340
Surplus or Deficit	—	80	110	180	260
Surplus or Deficit with Interest[c]	112	150	280	540	990

Source: Adcock and Associates, Inc. 1981.

Detail may not equal total because of rounding.

[a] Actual.

[b] Deficits are shown in parentheses.

[c] Interest compounded on projected surplus or deficit at 10 percent.

$1.81 million. As shown in Table 3-14, total revenues were comprised of operating funds ($0.8 million), enterprise funds ($0.6 million), and capital funds ($0.3 million). In comparison, operating fund expenditures were $0.9 million; enterprise fund expenditures were $0.6 million; and capital fund expenditures were $0.3 million (Table 3-14).

Gross Receipts taxes, the largest source of General Fund revenues, contributed approximately $191,000 or 22 percent of the FY 1981 operating fund revenues. Deficits were found in both the General Fund ($697,000 revenues compared to $756,000 in expenditures) and the capital fund ($291,000 compared to $332,000). However, transfers from the enterprise funds to both the general and capital funds helped cover most of the deficit.

General Fund deficits are projected for all fiscal years through FY 2000 in Bloomfield without the proposed action, indicating that the FY 1981 revenue structure is inadequate to maintain FY 1981 service levels under Baseline 1 (see Table 3-15). Similarly, deficits were projected in each year for other operating funds. In general, it is estimated that Bloomfield would experience deficits ranging from $100,000 to $120,000 annually in its operating budget through the year 2000.

San Juan County

The overall budget for San Juan County in FY 1981 showed a deficit of over $400,000. Total revenues were $13.2 million with $7.4 million in the General Fund, $2.7 million in capital funds, and $3.0 in other funds (Table 3-16). Expenditures totaled $13.6 million with $4.2 million in General Fund expenditures, $5.1 million in capital fund expenditures, and $4.3 million in other fund expenditures (Table 3-17). The major revenue sources of the county's General Fund were

Table 3-14. BLOOMFIELD EXPENDITURES FOR FISCAL YEAR 1981 (all budgeted funds - 1980 dollars)

Expenditure Function	Operating Funds General	Operating Funds Other[a]	Enterprise Funds Utilities[b]	Enterprise Funds Other[c]	Capital Funds	Total
General Government	232,738					232,738
Personal Services	142,950					142,950
Operating Expense	66,373					66,373
Capital Outlay	12,830					12,830
Other	10,585					10,585
Public Safety	332,694	44,312				377,006
Personal Services	245,382					245,382
Operating Expense	80,638					80,638
Capital Outlay	6,674	16,404				23,078
Other		27,908				27,908
Public Works	156,486	44,153	403,894	105,111	330,592	1,040,236
Personal Services	57,238		173,945	69,143		300,326
Operating Expense	63,297		177,403	29,715		270,415
Capital Outlay	22,678	42,753	41,654		330,592	437,677
Other	13,273	1,400	10,892	6,253		31,818
Health and Welfare	16,962	2,845				19,807
Personal Services	5,048					5,048
Operating Expense	7,714					7,714
Capital Outlay		2,845				2,845
Other	4,200					4,200
Recreation and Culture	17,456	11,244			1,629	30,329
Personal Services	5,542	6,526				12,068
Operating Expense	7,749	4,718				12,467
Capital Outlay	4,165				1,629	5,794
Other						-0-
Debt Service		54,330	56,526			110,856
General Obligation Bonds						-0-
Revenue Bonds		54,330	56,526			110,856
Total	756,336	156,884	460,420	105,111	332,221	1,810,972

Source: Adcock and Associates, Inc., 1982.

Data Source: Bloomfield Municipal Quarterly Report for period ending June 30, 1981.

[a] Fire protection, recreation, revenue sharing, city fire, criminal justice, emergency medical services, general obligation bond, investment revenue bond, paving district.

[b] Water and sewer, meter deposits, water and sewer revenue bonds.

[c] Solid waste disposal.

Table 3-15. BLOOMFIELD OPERATING FUNDS, PROJECTIONS WITHOUT PROPOSED ACTION (Baseline 1): 1985 - 2000 (thousands of constant 1980 dollars)

General Fund	1981[a]	1985	1990	1995	2000
Revenues					
Taxes	265	300	330	340	360
Charges and Miscellaneous	81	80	90	90	100
Grants	5	0[b]	0[b]	0[b]	0[b]
State Shared	346	380	430	440	470
Total Revenues	697	770	860	870	930
Expenditures					
General Government	233	260	300	300	320
Public Safety	333	370	420	420	450
Public Works	156	180	200	200	210
Health and Welfare	17	20	20	20	20
Recreation and Culture	17	20	20	20	20
Total Expenditures	756	850	960	960	1030
Surplus or Deficit[c]	(59)	(80)	(100)	(90)	(100)
Other Operating Funds					
Revenues	158	100	110	120	120
Expenditures	157	140	130	130	140
Surplus or Deficit	1	(40)	(20)	(10)	(20)
All Operating Funds					
Revenues	855	860	980	990	1050
Expenditures	913	980	1100	1100	1170
Surplus or Deficit	—	(120)	(120)	(100)	(120)
Surplus or Deficit with Interest[d]	(58)	(130)	(220)	(330)	(550)

Source: Adcock and Associates, Inc. 1981.

Detail may not equal total because of rounding.

[a] Actual.

[b] Rounds to zero.

[c] Deficits are shown in parentheses.

[d] Interest compounded on projected surplus or deficit at 10 percent.

Table 3-16. SAN JUAN COUNTY REVENUES FOR FISCAL YEAR 1981 (all budgeted funds - 1980 dollars)

Revenue Source	General Fund	Capital Funds[a]	Other Funds	Total
Own Source	6,419,857	485,988	1,686,622	8,592,467
Taxes	5,176,091		1,473,547	6,649,638
Property	3,044,704		879,692	3,924,396
Oil and Gas	2,131,387		593,855	2,725,242
Charges & Misc.	1,243,766	485,988	213,075	1,942,829
Licenses & Permits	69,621			69,621
Charges for Services	128,966			128,966
Interest on Invest.	849,326		64,893	914,219
Miscellaneous	195,853	485,988[b]	148,182	830,023[b]
Intergovernmental Transfers	1,004,885	2,239,235	1,354,760	4,598,880
Grants	83,278	2,239,235	1,032,567	3,355,080
Federal	60,000	511,861	925,496	1,497,357
State	23,278	1,727,374	107,071	1,857,723
P.I.L.O.T.	626,060			626,060
State Shared Revenues	295,547		322,193	617,740
Gasoline Tax	96,418			96,418
Auto License	190,436		317,846	508,282
Cigarette Tax	8,693		4,347	13,040
Gross Revenues	7,424,742	2,725,223	3,041,382	13,191,347
Transfers to (from)	(565,376)	924,722	(359,788)	(442)[c]
Net Revenues	6,859,366	3,649,945	2,681,594	13,190,905

Source: Adcock and Associates Inc., 1982.

Data Sources: San Juan County Treasurer's Financial Report for month of June 1981 and San Juan County Detailed Budget Report for month ending June 30, 1981.

[a] Road, farm and range, recreation, county hospital indigent, fire districts, revenue sharing, Lower Valley Park, C.H.I.N.S. child rehabilitation, bus route, hospital escrow, hospital lawsuit, taxes paid with protest, general obligation bonds, hospital bonds, jail bond.

[b] Includes $485,988 in bond sales proceeds.

[c] Transfers to other trust accounts and revenues for further distribution.

Table 3-17. SAN JUAN COUNTY EXPENDITURES FOR FISCAL YEAR 1981 (all budgeted funds - 1980 dollars)

Expenditure Function	General Fund	Capital Funds	Other Funds[a]	Total
General Government	1,956,122			1,956,122
Personal Services	1,172,978			1,172,978
Operating Expense	669,699			669,699
Capital Outlay	78,429			78,429
Other	35,016			35,016
Public Safety	1,235,687	2,703,447	296,659	4,235,793
Personal Services	908,644	3,980	5,800	918,424
Operating Expense	252,388	48,066	64,102	364,556
Capital Outlay	66,955	2,651,401	226,757	2,945,113
Other	7,700			7,700
Public Works	471,400	2,328,069	1,292,187	4,091,656
Personal Services	334,295		703,514	1,037,809
Operating Expense	133,611	24,961	578,369	736,941
Capital Outlay	3,494	1,666,757	10,304	1,680,555
Other		636,351		636,351
Health and Welfare	293,628	28,061	241,330	563,019
Personal Services			20,627	20,627
Operating Expense	276,360	3,194	117,986	397,540
Capital Outlay	17,268	24,867	102,717	144,352
Other				-0-
Recreation and Culture	235,985		51,019	287,004
Personal Services	102,589			102,589
Operating Expense	72,354		51,044	123,398
Capital Outlay	61,042			61,042
Other			(25)	(25)
Debt Service			2,465,565	2,465,565
General Obligation Bonds			1,258,270	1,258,270
Revenue Bonds			1,207,295	1,207,295
Total	4,192,822	5,059,577	4,346,760	13,599,159

Source: Adcock and Associates Inc., 1982.

Data Sources: San Juan County Treasurer's Financial Report for month of June 1981 and San Juan County Detailed Budget Report for month ending June 30, 1981.

[a] Road, farm and range, recreation, county hospital indigent, fire districts, revenue sharing, Lower Valley Park, C.H.I.N.S. child rehabilitation, bus route, hospital escrow, hospital lawsuit, taxes paid with protest, general obligation bonds, hospital bonds, jail bond.

property and oil and gas taxes. In FY 1981, these totaled $5.2 million.

San Juan County General Fund expenditures were concentrated on general governmental activities (46.7 percent of General Fund expenditures) and public safety (29.5 percent). Public works (11.2 percent), health and welfare (7.0 percent), and recreation and culture (5.6 percent) accounted for the remainder of General Fund expenditures. Capital funds expenditures were fairly evenly divided between public safety facilities (53.4 percent) and public works projects (46.0 percent).

It is estimated that, because of its sound property tax base, San Juan County would exhibit surpluses in its operating budget for the next 20 years without the proposed action (see Table 3-18). Other operating funds are projected to show continuing deficits throughout the period. Overall, however, the General Fund surplus is projected to exceed other operating fund deficits through FY 2000, resulting in an overall surplus for all operating funds.

School District Finances

Farmington Municipal School District. The Farmington Municipal School District received nearly $18.0 million in revenues and spent approximately $17.6 million in the 1980-1981 school year (see Tables 3-19 and 3-20). Operational Fund revenues accounted for $14.1 million, of which $11.3 million came from the State Equalization Guarantee transfers. (This fund provides state support to districts with low revenues and high costs.) Local property taxes contributed only $1.4 million to the district's Operational Fund. Total Operational Fund expenses were $13.9 million. Direct instruction costs for all funds were $7.4 million. Since there were no major

Table 3-18. SAN JUAN COUNTY OPERATING FUNDS, PROJECTIONS WITHOUT PROPOSED ACTION (BASELINE 1): 1985-2000 (thousands of constant 1980 dollars)

	1981[a]	1985	1990	1995	2000
General Fund					
Revenues					
Taxes	5,176	5,600	5,960	6,060	6,300
Charges and Miscellaneous	1,244[b]	350	370	380	390
Grants	83	90	100	110	110
P.I.L.O.T.	626	710	790	810	860
State Shared	296	340	370	380	400
Total Revenues	7,425	7,090	7,590	7,740	8,060
Expenditures					
General Government	1,956	2,230	2,460	2,520	2,680
Public Safety	1,236	1,410	1,560	1,590	1,690
Public Works	471	540	590	610	640
Health and Welfare	294	330	370	380	400
Recreation and Culture	236	270	300	300	320
Total Expenditures	4,193	4,780	5,280	5,400	5,730
Surplus or Deficit[c]	3,232	3,310	2,310	2,340	2,330
Other Operating Funds					
Revenues	3,041	3,300	3,590	3,670	3,860
Expenditures	4,347	4,610	4,830	4,890	5,040
Surplus or Deficit[c]	(1,306)	(1,310)	(1,240)	(1,220)	(1,180)
All Operating Funds					
Revenues	10,466	10,390	11,180	11,410	11,920
Expenditures	8,540	9,390	10,110	10,290	10,770
Surplus or Deficit[c]	1,926	1,000	1,070	1,120	1,150

Source: Adcock and Associates, Inc., 1982.

[a] Actual.

[b] Includes interest on investments not included in projections.

[c] Deficits are shown in parentheses.

Table 3-19. REVENUES FOR STUDY AREA SCHOOL DISTRICTS: 1980-1981
(constant 1980 dollars)

Item	Farmington Municipal Schools	Aztec Municipal Schools	Bloomfield Municipal Schools	Central Consolidated Schools
Operational Fund	14,082,785	5,165,621	5,591,138	11,710,236
Local Sources Subtotal	1,683,523	1,939,197	2,302,428	3,615,012
District School Tax Levy	1,443,028	1,837,890	2,130,800	3,253,626
Earnings from Investments	211,046	62,490	112,551	303,666
Other Local Sources	29,450	38,817	59,077	57,720
State Sources Subtotal	11,972,962	2,838,297	2,661,136	3,210,539
State Equalization Guarantee	11,296,736	2,381,360	1,979,575	2,325,000
Transportation	418,865	351,630	593,482	706,242
Other State Sources[a]	257,361	105,307	88,079	179,297
Federal Sources Subtotal	322,548	377,175	627,574	4,884,290
Public Law 874	306,218	85,196	616,768	4,802,260
Other Federal Sources	16,329	291,979	10,806	82,030
Incoming Transfers	87,691	0	0	0
Abatements	16,061	10,952	0	395
Other Funds	3,880,023	5,879,174	8,905,414	5,115,427
Building Fund	7,296	3,411,037	5,520,206	151,781
Sale of Bonds	0	2,940,000	5,550,000	0
Earnings from Investments	7,296	227,635	252,206	148,750
Other Building	0	243,402	18,000	3,031
Debt Service Funds	1,330,974	1,401,845	2,416,604	831,438
Interest Fund	285,639	244,710	586,426	177,828
Principal Fund	1,045,335	1,157,135	1,830,177	653,610
Cafeteria Fund	704,172	333,841	325,606	972,283
Miscellaneous Funds	1,837,580	732,452	642,998	3,159,925
Total Revenues	17,962,807	11,044,795	14,496,552	16,825,664

Source: Adcock and Associates, Inc., 1982.

Data Sources: Monthly Cash Report, 1980-1981, and Monthly Activity and Cafeteria Report, 1980-1981, Farmington Municipal Schools, Aztec Municipal Schools, Bloomfield Schools, Central Consolidated Schools and Gallup McKinley Consolidated Schools.

Note: Detail may not sum to total or subtotal due to rounding.

[a] State instructional materials credits are included in Other State Sources.

Table 3-20. FARMINGTON MUNICIPAL SCHOOL DISTRICT EXPENDITURES: 1980-1981 (constant 1980 dollars)

Item	Operational	Other[a]	Total
Administration	479,033	1,278	480,311
Direct Instruction	7,135,801	289,023	7,424,824
Instructional Support	1,515,954	147,227	1,663,180
Health Services	86,805	13,002	99,807
Pupil Transportation	426,438	0	426,438
Operation of Plant	1,127,804	1,021	1,128,825
Maintenance of Plant	385,123	318	385,440
Fixed Charges	1,573,507	63,130	1,636,637
Food Services/Cafeteria	36,343	663,908	700,251
Noninstructional Support	113,502	0	113,502
Community Services	27,191	0	27,191
Capital Outlay	827,414	4,332	831,746
Outgoing Transfer Accounts	0	0	0
Special Projects	109,654[b]	1,135,275[c]	1,244,929
Subtotal	13,880,912	2,318,514	16,235,768
Building Fund	N.A.	214,584	214,584
Debt Service	N.A.	1,180,585	1,180,585
Subtotal	N.A.	1,395,168	1,395,168
Total	13,880,912	3,713,682	17,594,594

Source: Adcock and Associates, Inc., 1982.

Data Source: Monthly Budget Report, June 1981, Farmington Municipal Schools.

Note: Detail may not sum to total or subtotal due to rounding.

N.A. = not applicable.

[a] ESEA, Title I; ESEA, Title IV; Indian Education Act, Title IV; Johnson-O'Malley; building; and debt service.

[b] Crosswalk patrol and ancillary services part.

[c] Capital Improvement SB 9; Noninstructional Student Fund; and Special Building (State).

construction projects, the building fund was relatively small ($215,000); debt service approached $1.2 million.

When compared to statewide averages of operational costs per pupil, the Farmington School District costs were considerably lower in the 1979-1980 school year: $1,633 in the district compared with $1,784 statewide, and $1,648 for school districts in New Mexico with enrollments between 5,000 and 10,000 students. Net operational expenditures were $1,425 per pupil in the Farmington district compared with $1,556 for the statewide average and $1,460 for comparably sized districts.

At the end of FY 1981, the district had $4.6 million in outstanding bonded debts compared to the state-imposed debt limit of nearly $9.1 million for that year. The property tax rate for debt service was $8.288 per $1,000 in assessed valuation. The overall property tax rate for the district was $19.213.

Given 1980-1981 revenue and expenditure patterns and projected enrollment and tax base changes, it is projected that the Farmington Municipal School District would maintain an annual surplus of about $750,000 for non-capital funds through the 1999-2000 school year, given 1980-1981 revenue and expenditure patterns (see Table 3-21).

Aztec Municipal School District. During the 1980-1981 school year, the Aztec Municipal School District experienced a budgetary surplus of $130,000. Total revenues were $11.0 million with operational fund revenues at $5.2 million (consisting mainly of $2.4 million in State Equalization Guarantee transfers and $1.8 million in property taxes). The district also received $2.9 million from the sale of bonds to finance construction projects. District expenses totaled $10.9 million with $2.5 million spent on direct instruction (see Table 3-22). Operational fund expenditures were nearly $5.0 million;

Table 3-21. PROJECTED SCHOOL DISTRICT FINANCES WITHOUT PROPOSED ACTION (Baseline 1), STUDY AREA SCHOOL DISTRICTS: 1989-2000 (thousands of constant 1980 dollars)[a,b]

	1989-1990	1994-1995	1999-2000
Farmington Municipal Schools			
Revenues	21,330	21,590	22,800
Expenditures	20,590	20,850	22,040
Surplus or Deficit	740	740	760
Aztec Municipal Schools			
Revenues	8,560	8,620	9,040
Expenditures	8,590	8,640	9,070
Surplus or Deficit[c]	(30)	(20)	(30)
Bloomfield Municipal Schools			
Revenues	10,170	10,350	10,940
Expenditures	9,290	9,470	10,040
Surplus or Deficit	880	880	900

Source: Adcock and Associates, Inc. 1981.

[a] Does not include capital funds.

[b] Budget data for the Lower Valley portion of the Central Consolidated School District could not be separated accurately from the district totals. Therefore finances for the district without the proposed action were not projected.

[c] Deficits are shown in parentheses.

Table 3-22. AZTEC MUNICIPAL SCHOOL DISTRICT EXPENDITURES: 1980-1981 (constant 1980 dollars)

Item	Operational	Other[a]	Total
Administration	207,738	0	207,738
Direct Instruction	2,401,068	93,744	2,494,812
Instructional Support	611,769	38,154	649,924
Health Services	18,882	0	18,882
Pupil Transportation	362,985	458	363,443
Operation of Plant	384,751	50	384,801
Maintenance of Plant	172,027	285	172,312
Fixed Charges	539,644	14,796	554,440
Food Services/Cafeteria	0	339,909	339,909
Noninstructional Support	36,946	0	36,946
Community Services	27,846	0	27,846
Capital Outlay	111,249	2,704	113,953
Outgoing Transfer Accounts	9,450	0	9,450
Special Projects	68,345[b]	291,156[c]	359,501
Subtotal	4,952,701	781,256	5,733,956
Building Fund	N.A.	3,644,472	3,644,472
Debt Service	N.A.	1,534,617	1,534,617
Subtotal	N.A.	5,179,089	5,179,089
Total	4,952,701	5,960,345	10,913,046

Source: Adcock and Associates, Inc., 1982.

Data Source: Monthly Budget Report, June 1981, Aztec Municipal Schools.

Note: Detail may not sum to total or subtotal due to rounding.

N.A. = not applicable.

[a] ESEA, Title I; ESEA, Title IV; building; and debt service.

[b] JOM Parental Services; Basketball Camp; and BIA Title I.

[c] Capital Improvement SB 9 and Noninstructional Student Fund.

capital construction costs exceeded $3.6 million; and debt service expenditures were over $1.5 million.

Per pupil operational expenditures for the school year ending in 1980 were $1,965, which were considerably above the statewide average of $1,784, and the $1,871 average for New Mexico school districts with enrollments between 1,000 and 2,500 students. Net operational expenditures of $1,556 per pupil for the district were about the same as those for comparably sized districts ($1,552) and were equal to the statewide average. The total outstanding bonded debt for the district was $6.6 million at the end of FY 1981, which was less than the debt limit ot $10.4 million. The property tax rate for debt service was $6.364 per $1,000 in assessed valuation; the total property tax rate was $17,289.

Aztec Municipal Schools are projected to have a small (about $30,000) annual deficit for non-capital funds through the 1999-2000 school year given 1980-1981 revenue and expenditure patterns (see Table 3-21).

Bloomfield Municipal School District. Bloomfield Municipal School District revenues for the 1980-1981 school year were $14.5 million compared to expenditures of $9.1 million (Tables 3-19 and 3-23). During that school year, the district sold $5.6 million in bonds for school construction. Operational Fund revenues were $5.6 million. The district's principal revenue sources for the Operational Fund were property taxes ($2.1 million) and the State Equalization Guarantee ($2.0 million). Of the $9.1 million in expenses, $2.9 million went toward direct instruction, $1.4 million went to the Building Fund, and $1.3 million went to debt service. District plans for additional construction projects over the next school year are to be financed with the remaining monies from the bond sale.

Table 3-23. BLOOMFIELD MUNICIPAL SCHOOL DISTRICT EXPENDITURES: 1980-1981 (constant 1980 dollars)

Item	Operational	Other[a]	Total
Administration	171,314	5,598	176,913
Direct Instruction	2,638,533	246,177	2,884,710
Instructional Support	644,595	103,232	747,827
Health Services	30,575	13,817	44,392
Pupil Transportation	600,213	0	600,213
Operation of Plant	417,221	0	417,221
Maintenance of Plant	158,172	0	158,172
Fixed Charges	629,281	46,084	675,366
Food Services/Cafeteria	0	295,129	295,129
Noninstructional Support	82,635	21,165	103,800
Community Services	17,894	17,154	35,048
Capital Outlay	248,651	5,270	253,921
Outgoing Transfer Accounts	0	0	0
Special Projects	0	64,434[b]	64,434
Subtotal	5,639,087	818,061	6,457,147
Building Fund	N.A.	1,361,056	1,361,056
Debt Service	N.A.	1,270,360	1,270,360
Subtotal	N.A.	2,631,416	2,631,416
Total	5,639,087	3,449,477	9,088,564

Source: Adcock and Associates, Inc., 1982.

Data Source: Monthly Budget Report, June 1981, Bloomfield Municipal Schools.

Note: Detail may not sum to total or subtotal due to rounding.

N.A. = not applicable.

[a] ESEA, Title I; ESEA, Title IV; Indian Education Act, Title IV; Johnson-O'Malley; building; and debt service.

[b] Capital Improvement SB 9 and Noninstructional Student Fund.

During the 1979-1980 school year, Bloomfield's average expenses per pupil were $1,982, almost $200 above the statewide average of $1,784 and $160 above the average for school districts with enrollments between 2,500 and 5,000 (e.g., $1,827). Per pupil net operational expenditures were $1,487, which was less than the statewide average of $1,556, and less than the $1,578 average for similarly sized districts.

The district's outstanding bonded debt at the end of FY 1981 was $9.1 million, compared to the district's debt limit of $11.3 million. The property tax rate for debt service was $11.277 per $1,000 in assessed valuation. The total property tax rate for the district was $20.202.

The Bloomfield Municipal School District non-capital funds are projected to show an annual surplus of at least $880,000 per year through the 1999-2000 school year, given 1980-1981 revenue and expenditure patterns (see Table 3-21).

Central Consolidated School District. The Central Consolidated School District exhibited overall revenues of $16.8 million and expenditures of $16.1 during the 1980-1981 school year (see Tables 3-19 and 3-24). [Budget data for the Lower Valley portion of the Central Consolidated School District could not be separated accurately from the district totals. Thus this discussion refers to the entire district, which includes portions of the Navajo Reservation. Consequently, finances for the district without the proposed action were not projected.] Operational revenues exceeded $11.7 million, with property taxes and the State Equalization Guarantees contributing $3.3 million and $2.3 million, respectively. The largest contribution was from Federal Impact Aid programs (Public Law 874), which provided $4.8 million in Operational Fund revenues. Expenditures for the district

Table 3-24. CENTRAL CONSOLIDATED SCHOOL DISTRICT EXPENDITURES: 1980-1981 (constant 1980 dollars)

Item	Operational	Other[a]	Total
Administration	377,330	2,000	379,330
Direct Instruction	4,634,966	1,141,971	5,776,937
Instructional Support	1,046,124	426,593	1,472,717
Health Services	71,739	45,835	117,573
Pupil Transportation	691,132	0	691,132
Operation of Plant	1,113,925	7,443	1,121,368
Maintenance of Plant	605,046	27,887	632,933
Fixed Charges	1,082,368	240,908	1,323,276
Food Services/Cafeteria	0	931,122	931,122
Noninstructional Support	117,883	17,329	135,212
Community Services	0	23,669	23,669
Capital Outlay	638,144	71,204	709,348
Outgoing Transfer Accounts	0	0	0
Special Projects	0	321,171[b]	321,171
Subtotal	10,378,658	3,257,131	13,635,790
Building Fund	N.A.	1,518,339	1,518,339
Debt Service	N.A.	883,222	883,222
Subtotal	N.A.	2,401,561	2,401,561
Total	10,378,658	5,658,692	16,037,351

Source: Adcock and Associates, Inc., 1982.

Data Source: Monthly Budget Report, June 1981, Central Consolidated Schools.

Note: Detail may not sum to total or subtotal due to rounding.

N.A. = not applicable.

[a] ESEA, Title I; Indian Education Act, Title IV; Johnson-O'Malley.

[b] Capital Improvement SB 9, Teacherage, and Ancillary Services.

were primarily for operational expenses ($10.4 million). Direct instruction costs were $5.8 million and Building Fund expenditures were $1.5 million.

Per capita operational expenses were $1,653 in the 1979-1980 school year while net operational expenditures were $1,397. These figures were less than the statewide average of $1,784 and $1,556, respectively, but were similar to the $1,648 and $1,460 averages for school districts with enrollments ranging from 5,000 to 10,000 students.

At the end of FY 1981, the district had $3.9 million in outstanding bonded debt, which was considerably less than the district's debt limit of $24.6 million. The property tax rate for debt service in the district was $2.183 per $1,000 in assessed valuation. The overall property tax rate was $11.108.

HOUSING

The 1980 census indicated a total housing stock of 29,730 in San Juan County. The majority of these housing units were located in the study area communities: Farmington had 12,009, Aztec had 2,009, Bloomfield had 1,770, the Lower Valley (Waterflow, Fruitland, Kirtland, and surrounding areas to the west of Farmington) had 1,526, Flora Vista (between Farmington and Aztec) had 1,318, Lee Acres (between Farmington and Bloomfield) had 1,607, and La Plata, Cedar Hill, and Blanco had 515, 275, and 345 housing units, respectively.

Table 3-25 summarizes and compares 1970 and 1981 housing stock statistics for San Juan County and selected study area communities. Between 1970 and 1981, total year-round housing stock in the county more than doubled, increasing from 14,802 to 30,189. In addition, the composition of the housing stock changed substantially during that

Table 3-25. HOUSING UNITS, SAN JUAN COUNTY AND SELECTED STUDY AREA COMMUNITIES: 1970 and 1981

	1970		1981	
	Number	Percent of Total[a]	Number	Percent of Total[a]
San Juan County				
Total	14,802	100.0	30,189	100.0
Single-Family	11,668	78.8	19,616	65.5
Multifamily	1,586	10.7	4,065	13.5
Mobile Homes	1,548	10.5	6,508	21.6
Farmington				
Total	6,867	100.0	12,436	100.0
Single-Family	5,140	74.8	7,523	60.5
Multifamily	923	13.4	2,564	20.6
Mobile Homes	804	11.7	2,349	18.9
Aztec				
Total	1,066	100.0	2,103	100.0
Single-Family	843	79.1	1,183	56.2
Multifamily	155	14.5	414	19.7
Mobile Homes	68	6.4	506	24.1
Bloomfield				
Total	432	100.0	2,000	100.0
Single-Family	315	72.9	1,151	57.6
Multifamily	50	11.6	112	5.6
Mobile Homes	67	15.5	737	36.8
Rural[b]				
Total	6,437	100.0	13,650	100.0
Single-Family	5,370	83.4	9,759	71.5
Multifamily	458	7.1	975	7.1
Mobile Homes	609	9.5	2,916	21.4

Source: Adcock and Associates, Inc., 1982.

[a] Numbers may not add to 100.0 due to rounding.

[b] Data include housing units located on the Navajo Reservation.

period. The most notable change was an overall increase in the proportion of mobile homes. For example, in San Juan County as a whole, mobile homes represented 10.5 percent of the total stock in 1970 and 21.6 percent in 1981. While the proportion of multifamily housing units also increased, the percentage of conventional single family detached homes decreased.

Table 3-26 shows the projected demand for housing without the proposed action (Baseline 1) for communities in the study area from 1985 through the year 2000. As shown in the table, overall housing demand is estimated to increase steadily through the study period, except during the early 1990s. In general, the annual increases in projected demand are moderate compared with the 726-unit average annual addition to the housing stock in Farmington, Aztec, and Bloomfield between 1970 and 1981. Except for two time periods (1984-85 and 1988-89), the projected changes for the study area, including the Lower Valley, Flora Vista, and Lee Acres, are less than 726 units. Thus, it is assumed that the housing construction industry in the area would have the potential physical capacity to keep pace with the projected increase in demand, except in 1984-85 and 1988-89. Moreover, there is sufficient vacant residential land in the area to accommodate the projected growth. (For example, in Farmington there were 7,187 acres of land zoned for residential use in 1980, compared to a total projected need in the year 2000 of approximately 3,500 acres.) However, if high interest rates persist, it is probable that very few additions to the conventional single family and multifamily housing stocks would be made. Thus the proportion of mobile homes to total housing units would potentially increase.

MUNICIPAL SERVICES

Water Supply

An analysis of current and projected water supply includes an examination of water rights, system capacities, and water use.

Most of the water used for domestic purposes in the study area is provided by the Farmington, Aztec, and Bloomfield municipal water systems and by 8 water users associations (see Map 3-1). Of the water users associations, 7 obtain water from the municipal systems; the Blanco Water Users Association does not.

Table 3-27 presents 1981 data for the study area water systems. Table 3-28 contains projections of water demand through the year 2000 (based on current per capita use, adjusted for changes in per capita use projected by the New Mexico State Engineer's Office).

The Farmington municipal water system has sufficient water rights to meet projected city demand through the year 2000. However, if the system continues to also provide water to the Lower Valley and La Plata water users associations, additional water rights would be required by 1990.[1] Nonetheless, peak day use is projected to remain below system capacity through the year 2000, even if the system continues to supply water to the water users associations. This analysis assumes that the Farmington system would continue to supply water to the Lower Valley and La Plata water users associations and that the necessary additional water rights would be purchased.

The Aztec municipal water system provides water to the Flora Vista and Southside Water Users Associations, as well as the City of Aztec. While water use in 1980 was below current treatment capacity, it marginally exceeded Aztec's existing water rights. Meeting

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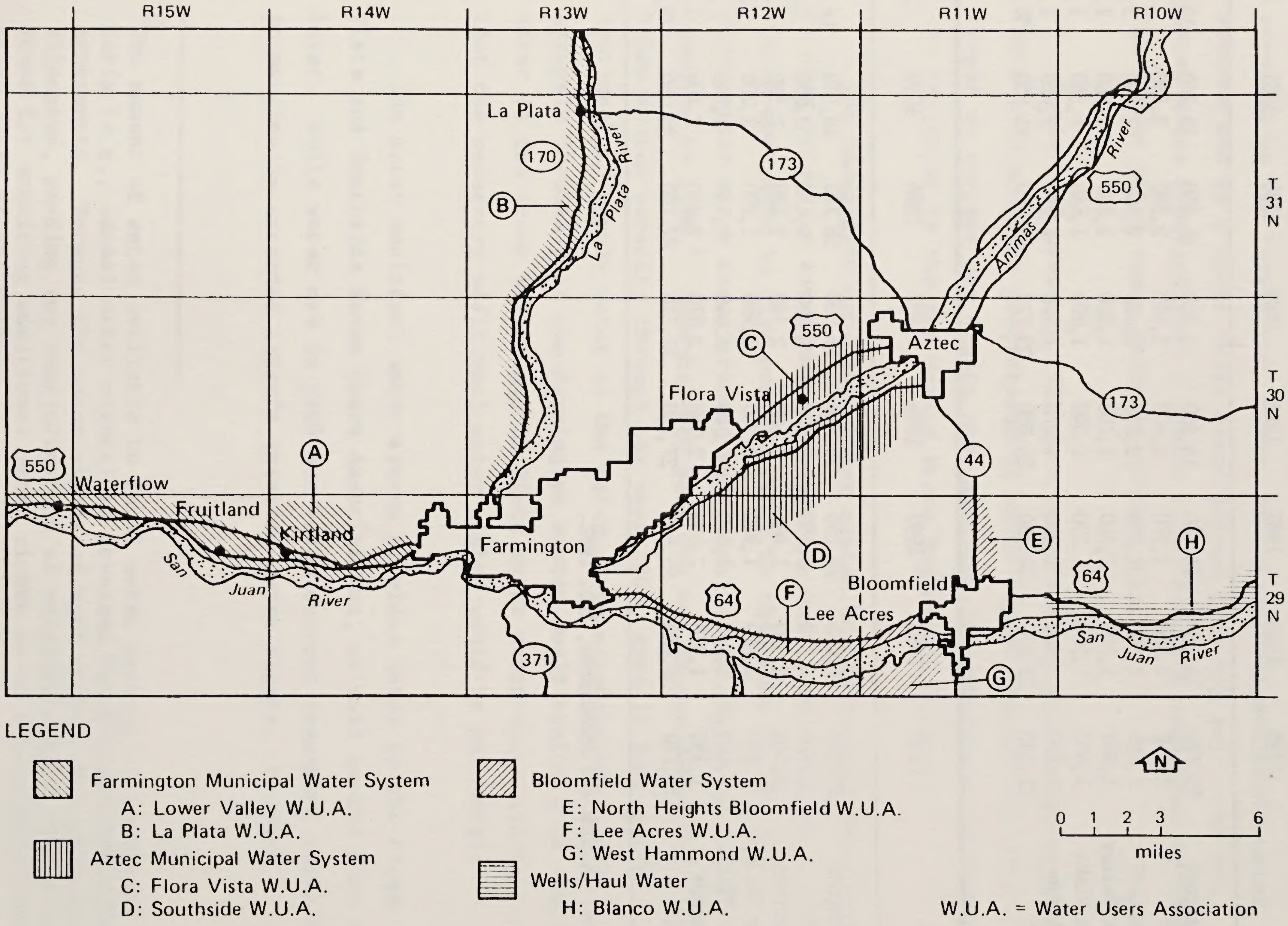
[1] The amount of water available to local water systems on an annual basis (e.g., annual water rights) is governed by specific interstate agreements. Because the water rights of each system have been fully allocated, pending any readjudication of existing rights, the only means for acquiring additional water rights is to obtain them from other water rights holders.

Table 3-26. PROJECTED HOUSING DEMAND WITHOUT PROPOSED ACTION (BASELINE 1), STUDY AREA COMMUNITIES: 1985-2000

Area	1985	1986	1987	1988	1989	1990	1991	1992
Farmington	13,770	14,150	14,580	14,960	15,510	16,030	15,740	15,940
Aztec	2,260	2,330	2,370	2,400	2,490	2,580	2,460	2,530
Bloomfield	2,180	2,160	2,250	2,290	2,420	2,400	2,390	2,400
Lower Valley	1,800	1,720	1,760	1,790	1,830	1,860	1,860	1,860
Flora Vista	1,460	1,500	1,530	1,540	1,600	1,640	1,580	1,610
Lee Acres	1,770	1,800	1,840	1,870	1,920	1,970	1,920	1,950
Total	23,240	23,660	24,330	24,850	25,770	26,480	25,950	26,290

Area	1993	1994	1995	1996	1997	1998	1999	2000
Farmington	15,850	16,050	16,230	16,360	16,580	16,780	16,960	17,160
Aztec	2,470	2,540	2,580	2,600	2,630	2,650	2,650	2,690
Bloomfield	2,440	2,390	2,460	2,480	2,580	2,480	2,560	2,600
Lower Valley	1,860	1,890	1,910	1,940	1,960	1,990	2,000	2,030
Flora Vista	1,600	1,640	1,660	1,680	1,690	1,730	1,740	1,760
Lee Acres	1,950	1,970	2,000	2,040	2,070	2,070	2,100	2,140
Total	26,170	26,480	26,840	27,100	27,510	27,700	28,010	28,380

Source: Adcock and Associates, Inc. 1982.



Source: Adcock and Associates, Inc 1982

Map 3-1. STUDY AREA WATER SYSTEMS

Table 3-27. MUNICIPAL WATER SYSTEM CHARACTERISTICS, STUDY AREA COMMUNITIES: 1981

Item	Farmington Municipal Water System	Aztec Municipal Water System	Bloomfield Water System
Annual Water Rights[a] (acre-feet)	18,103	1178	727[b]
Treatment Capacity			
Annual (acre-feet)	44,809	1608	1680
Daily (1000 gal)	40,000	1500	1500
Storage Capacity			
Raw (acre-feet)	7,620	31	80
Treated (1000 gal)	16,500	3250	750
Use[c]			
Annual Withdrawal (acre-feet)	14,179	1188	1100[d]
Peak Day (1000 gal)	23,000	2100[d]	2000

Source: Adcock and Associates Inc. 1982.

[a] Farmington and Bloomfield water source is the San Juan River; Aztec water source is the Animas River.

[b] The North Heights Bloomfield, West Hammond, and Lee Acres water users associations held 327 of the total 727 annual acre-feet of water rights; the remaining 400 acre-feet were held by the Bloomfield Water System.

[c] Data are for 1980.

[d] Estimated.

Table 3-28. PROJECTED ANNUAL WATER USE WITHOUT PROPOSED ACTION (BASELINE 1), STUDY AREA WATER SYSTEMS: 1985-2000 (acre-feet per year)

Water System	1985	1990	1995	2000
Farmington Municipal Water System				
City of Farmington	14,000	16,400	16,790	17,980
WUAs	2,980	3,010	3,060	3,130
Total	16,980	19,410	19,850	21,110
Aztec Municipal Water System				
City of Aztec	1,260	1,450	1,460	1,570
WUAs	400	510	580	680
Total	1,660	1,960	2,040	2,250
Bloomfield Water System				
City of Bloomfield	840	1,030	1,160	1,330
WUAs	500	630	740	860
Total	1,340	1,660	1,900	2,190
Blanco Water Users Association	38	44	53	62

Source: Adcock and Associates, Inc. 1982.

Note: WUA = Water Users Association.

projected demand for the year 2000 would require the acquisition of an additional 1,070 acre-feet of water rights. Peak day demands in the year 2000 could be met with the expansion of treatment capacity, which could be accomplished by the addition of a pump. This analysis assumes that the Aztec system would purchase necessary additional water rights as well as a new water treatment pump to meet increased demand without the proposed action.

In 1980, the Bloomfield water system was also in need of additional water rights. Moreover, the peak daily demand also exceeded treatment capacity, necessitating drawdown of stored water. Baseline demand for the City of Bloomfield is projected to be 1,330 acre-feet in the year 2000, compared with the system's current water rights of 727 acre-feet. In addition, the Bloomfield system supplies water to the Lee Acres, West Hammond, and North Heights Bloomfield water users associations. By the year 2000, total system demand is projected to be 2,190 acre-feet, or about three times the 1980 level of water rights for the entire system. This analysis assumes that the Bloomfield system would acquire additional water rights necessary to meet the projected increase in demand.

Aggregate projections of annual water use for the water users associations are shown in Table 3-28. Except for the Blanco Water Users Association, the comparison of projected water demand with projected water rights for the water users associations was completed as part of the analysis for the Farmington, Aztec, and Bloomfield water systems. As stated above, this analysis assumes that the municipal systems would purchase necessary additional water rights to meet increased demand that would occur in the study area without the proposed action. In addition, the analysis assumes that the Bloomfield Water Users Association would increase system production to meet projected water demands through the year 2000.

The water users associations serving the study area's rural residents are primarily water distribution systems. In addition to a distribution network, each association (except for Upper La Plata) also provides some water storage. The Blanco Water Users Association is the association with an independent source of supply. (The Blanco system obtains water from a spring, which supplies about 37,400 gallons per day, and a shallow well, which produces about 23,000 gallons per day.)

Over the past several years, the water users associations have had substantial waiting lists of potential customers. For example, in 1978, the eight associations had a combined total of 757 applications for hookups, compared to a total of 1,885 hookups. There are two reasons for the backlog of customers. First, except for the North Heights Bloomfield, Lee Acres, and West Hammond water users associations, which had a combined 327 acre-feet per year in contract water, the associations have no water rights of their own. Thus, those associations which obtain water from Aztec or Bloomfield are constrained by the shortage of rights available to those municipal systems. The second factor relates to the financial status of the associations. The associations obtain operating revenues through customer charges and have traditionally relied on funding from the Farmers Home Administration (FmHA) for capital funding. During recent years, FmHA loans were available only for current, not projected needs. Thus, the water users associations have been in a position of having inadequate sources of funding to meet capital facility expansion requirements.

Wastewater Systems

Farmington, Aztec, and Bloomfield have wastewater systems which extend to most areas within the corporate limits of the cities. The rest of the study area relies primarily on the use of septic tanks for wastewater disposal.

The Farmington wastewater treatment plant, completed in 1981, has a capacity of 11 million gallons per day (mgpd). While the treatment plant had excess capacity (for example, the 1981 load was estimated at about 8 mgpd), almost one-third of the city's 200 miles of sewer pipes were badly corroded and needed to be replaced. Based on projected municipal water use without the proposed action (Baseline 1), wastewater loads are projected to reach 11 mgpd in 1989 and 12.65 mgpd in the year 2000. This analysis assumes that the sewer pipes would be replaced and that the treatment plant would be expanded.

In 1981, Aztec's wastewater treatment plant was operating at its design capacity of 1 mgpd. Construction of a new plant was scheduled to begin in 1982, with completion expected in 1983. The new facility, which would have an initial capacity of 1.5 mgpd, could be expanded to a capacity of 3 mgpd. This analysis assumes that adequate water treatment service would be available in Aztec through the year 2000, when wastewater loads are projected to reach 1.16 mgpd.

The Bloomfield sewage treatment facility was completed in 1978 and has a capacity of 1.5 mgpd. This capacity exceeds projected wastewater loads of 0.95 mgpd by the year 2000 (without the proposed action).

In the rural portion of the study area, on-site septic tank systems are used for wastewater disposal. Although these systems have not been identified as a source of contamination of ground or river water, a recently completed study determined that adverse health or aesthetic effects may result from the use of septic systems at many housing sites in the study area. The potential problems are associated with housing sites in places with high water tables, slow-percolation soils, or adverse drainage conditions. The study estimated that as many as 45.9 percent of the housing units in the Lower Valley were in potential problem areas and that as many as

35.1 percent and 13.8 percent were in potential problem areas in Flora Vista and Lee Acres, respectively (Vandegrift 1981). While the exact nature and magnitude of the potential adverse health and aesthetic effects resulting from the use of septic tanks in the study area could not be determined, this analysis assumes that the rise in the number of housing units and septic tanks resulting from the increased population without the proposed action would exacerbate existing septic-tank-related problems.

Solid Waste Disposal

The City of Farmington contracts with a private company for weekly solid waste disposal service and the operation of the municipal landfill. The landfill, which will reach capacity in 1983, will be replaced with a new site with an estimated life of 10-20 years. Without the proposed action (Baseline 1), the contractor would need to expand the fleet from 9 to 11 trucks by 1990. This number would adequately serve customer demand through the year 2000. This analysis assumes that the new landfill would be developed and that the contractor would expand the fleet as necessary to meet projected demands.

In 1981, the City of Aztec operated its own solid waste disposal system which included two refuse collection vehicles. The city's 20-acre landfill (opened in 1977) has an estimated life of 15 years. (Other suitable land would be available in the area to meet future needs.) Projected demand for the city indicates that one additional waste collection vehicle would be required in 1990 to maintain present levels of service. This analysis assumes that the city would purchase the necessary vehicle and would acquire additional land to meet projected demands without the proposed action.

In 1982, the private contractor that provided solid waste disposal service to Farmington expanded its service area to include the residents of Bloomfield. At that time, the contractor acquired three refuse collection vehicles to replace those previously used by the City of Bloomfield. Based on projections without the proposed action (Baseline 1), only one additional vehicle would be required (in 1990) to adequately serve Bloomfield's needs until the year 2000. This analysis assumes that the contractor would purchase the additional vehicle.

Three private contractors provided solid waste disposal for the remainder of the study area in 1981. These contractors utilized landfills operated by San Juan County. This analysis assumes that without the proposed action (Baseline 1), both the county and the private contractors would provide adequate solid waste disposal service for the increased population in the rural portion of the study area.

PUBLIC EDUCATION

Four public school districts in San Juan County would be potentially affected by the construction and operation of the proposed action. These include the Farmington Municipal, Aztec Municipal, Bloomfield Municipal, and Central Consolidated school districts. Tables 3-29 through 3-32 present enrollment figures for the 1980-1981 school year and annual projections of student enrollment without the proposed action (Baseline 1) from 1985 through the year 2000.

Farmington Municipal School District

The Farmington Municipal School District had 10 elementary schools, 3 junior high schools, and 1 high school, with a total enrollment of almost 8,000 students in the 1980-1981 school year. While district facilities were overcrowded in 1981 and while 44 portable classrooms were being utilized to provide temporary relief, a

Table 3-29. FARMINGTON MUNICIPAL SCHOOL DISTRICT: PROJECTED STUDENT POPULATION WITHOUT PROPOSED ACTION (BASELINE 1): 1985-2000

	Grades K-6	Grades 7-9	Grades 10-12	Special Education	Total
1980-81*	4369	1755	1674	190	7,988
1985-86	5190	1945	2050	225	9,410
1986-87	5350	2005	2115	230	9,700
1987-88	5490	2060	2170	240	9,960
1988-89	5690	2135	2250	245	10,320
1989-90	5880	2205	2325	255	10,665
1990-91	5775	2165	2285	250	10,475
1991-92	5845	2195	2310	255	10,605
1992-93	5815	2180	2300	250	10,545
1993-94	5885	2210	2330	255	10,680
1994-95	5955	2235	2355	255	10,800
1995-96	6000	2250	2375	260	10,885
1996-97	6080	2280	2405	265	11,030
1997-98	6155	2310	2435	265	11,165
1998-99	6220	2335	2460	270	11,285
1999-2000	6295	2360	2490	270	11,415

Source: Adapted from Adcock and Associates, Inc. 1982.

*Actual enrollment.

Table 3-30. AZTEC MUNICIPAL SCHOOL DISTRICT, PROPOSED STUDENT POPULATION WITHOUT PROPOSED ACTION (BASELINE 1): 1985-2000

	Grades K-6	Grades 7-9	Grades 10-12	Special Education	Total
1980-81*	1348	600	539	67	2554
1985-86	1560	645	630	75	2910
1986-87	1590	655	640	80	2965
1987-88	1610	665	650	80	3005
1988-89	1665	690	675	80	3110
1989-90	1720	710	695	85	3210
1990-91	1645	680	665	80	3070
1991-92	1685	695	680	85	3145
1992-93	1660	685	670	80	3095
1993-94	1710	705	690	85	3190
1994-95	1730	715	700	85	3230
1995-96	1745	720	705	85	3255
1996-97	1765	730	715	85	3295
1997-98	1785	735	720	85	3325
1998-99	1795	740	725	90	3350
1999-2000	1815	750	735	90	3390

Source: Adapted from Adcock and Associates, Inc. 1982.

*Actual enrollment.

Table 3-31. BLOOMFIELD MUNICIPAL SCHOOL DISTRICT, PROJECTED STUDENT POPULATION WITHOUT PROPOSED ACTION (BASELINE 1): 1985-2000

	Grades K-6	Grades 7-9	Grades 10-12	Special Education	Total
1980-81*	1549	704	590	103	2946
1985-86	1745	725	710	115	3295
1986-87	1810	750	735	120	3415
1987-88	1835	760	745	120	3460
1988-89	1910	795	780	125	3610
1989-90	1930	800	785	125	3640
1990-91	1895	785	775	125	3580
1991-92	1920	795	785	125	3625
1992-93	1935	805	790	125	3655
1993-94	1920	795	785	125	3625
1994-95	1965	815	800	130	3710
1995-96	1990	825	810	130	3755
1996-97	2045	850	835	135	3865
1997-98	2005	830	820	130	3785
1998-99	2050	850	835	135	3870
1999-2000	2085	865	850	135	3935

Source: Adapted from Adcock and Associates, Inc. 1982.

*Actual enrollment.

Table 3-32. CENTRAL CONSOLIDATED SCHOOL DISTRICT (LOWER VALLEY), PROJECTED STUDENT POPULATION WITHOUT PROPOSED ACTION (BASELINE 1): 1985-2000

	Grades K-6	Grades 7-9	Grades 10-12	Special Education	Total
1980-81*	1352	536	439	155	2482
1985-86	1460	600	545	170	2775
1986-87	1475	610	550	170	2805
1987-88	1485	615	555	175	2830
1988-89	1510	625	565	175	2875
1989-90	1525	630	570	175	2900
1990-91	1525	630	570	175	2900
1991-92	1525	630	570	175	2900
1992-93	1525	630	570	175	2900
1993-94	1540	635	575	180	2930
1994-95	1545	640	580	180	2945
1995-96	1560	645	585	180	2970
1996-97	1565	645	590	180	2980
1997-98	1580	655	595	185	3015
1998-99	1585	655	600	185	3025
1999-2000	1600	660	605	185	3050

Source: Adapted from Adcock and Associates, Inc. 1982.

*Actual enrollment.

more permenent increase in facility capacity was not anticipated to occur in the short run. Because of the defeat by district voters of the most recent school bond proposal, no major construction projects were planned for at least two years. During that time, school board officials anticipated purchasing additional portable classrooms to accommodate increases in student enrollment.

Enrollment in the district is projected to grow substantially between 1980 and 1990 without the proposed action (Baseline 1), as shown in Table 3-29. Approximately 120 additional teachers would be required by 1990 for the estimated increase of almost 2,500 students (over the 1981 level); an additional 46 teachers (over the 1990 requirements) would be needed by the year 2000 (see Table 3-33). Moreover, by the year 2000, Farmington would need 5 additional elementary schools and 1 to 2 additional secondary schools. This analysis assumes that while the demand for teachers would be met without the proposed action, severe shortages of permanent facilities would occur given the failure of the district to pass school bond proposals to meet existing demands.

Aztec Municipal School District

During the 1980-1981 school year, a total of 2,554 students were enrolled in the Aztec Municipal School District's 3 elementary schools, 1 junior high school, and 1 high school. In 1981 all schools in the district had excess capacity, and a new high school was scheduled for completion by 1985. In addition, the district also had 5 portable classrooms that could be used to accommodate short-term increases in demand.

In the absence of the proposed action, enrollment in the Aztec district is projected to generally increase over the next 20 years (see Table 3-30). For example, total enrollment is estimated to

Table 3-33. PROJECTED TEACHER REQUIREMENTS WITHOUT PROPOSED ACTION (BASELINE 1), STUDY AREA SCHOOL DISTRICTS: 1985-2000

School Districts/ Grade Level	1980-1981[a]	1985-1986	1990-1991	1995-1996	1999-2000	Percentage Change (1980-2000)
Farmington Municipal Schools						
K-6	212	252	280	291	306	44
7-12	170	198	221	229	240	41
Total K-12[b]	395	465	518	538	564	43
Aztec Municipal Schools						
K-6	65	76	79	84	88	35
7-12	60	67	70	74	78	30
Total K-12[b]	131	150	158	167	174	33
Bloomfield Municipal Schools						
K-6	70	79	85	90	94	34
7-12	70	78	85	89	94	34
Total K-12[b]	144	162	175	184	193	34
Central Consolidated Schools (Lower Valley)						
K-6	62	66	69	71	73	18
7-12	41	48	50	52	53	29
Total K-12[b]	113	126	132	135	138	22

Source: Adapted from Adcock and Associates, Inc. 1982.

[a] Actual enrollment.

[b] Includes Special Education teachers not included in K-6 and 7-12 subtotals.

increase by approximately 515 students between 1980-1981 and 1989-1990, and by an additional 320 students between 1989-1990 and 1999-2000. Based on the projected enrollments, it is estimated that approximately 27 more teachers would be needed by 1990, and 16 more by the year 2000 (see Table 3-33). In addition, it is estimated that 1 more elementary school and 1 more secondary school would be needed by the year 2000. This analysis assumes that the district would meet the demands for additional teachers and additional facilities.

Bloomfield Municipal School District

The Bloomfield Municipal School District had 3 elementary schools, 1 junior high school, and 1 high school with a total 1980-1981 enrollment of approximately 3,000 students. In 1981, the junior and senior high schools were operating at 85 percent capacity, while the elementary schools were at 95 percent capacity. To relieve the strain on the elementary facilities, a new elementary school (with an estimated capacity of 500 students) was under construction with a scheduled opening in early 1982.

Based on population projections without the proposed action (Baseline 1), Bloomfield School District enrollment is expected to increase by 634 students by 1990, and by an additional 355 students by the year 2000 (see Table 3-32). This increase would require an additional 31 teachers by 1990, and 18 more between 1990 and the year 2000 (see Table 3-33). Moreover, by the year 2000, the district would need 1 additional elementary school and 1 additional secondary school. This analysis assumes that the Bloomfield district would meet the demands for additional teachers and facilities.

Central Consolidated School District (Lower Valley)

The Central Consolidated School District operates 3 elementary schools, 1 junior high school, and 1 senior high school in the Lower

Valley portion of the district. Total 1980-1981 enrollment for this area was 2,482. Schools in this nonreservation area were operating at or above capacity in 1981 and portable classrooms were in use.

Based on population projections without the proposed action (Baseline 1) for the Lower Valley portion of the Central Consolidated School District, school enrollments for this area are expected to increase by 418 students by 1990, and by an additional 150 students in the year 2000 (see Table 3-32). This increase would necessitate hiring 19 additional teachers by 1990, and 6 more by 2000 (see Table 3-33). Moreover, the Lower Valley area may require additional elementary and secondary school facilities as early as 1985. With these new facilities, the district should have adequate capacity to accommodate demand through the year 2000. This analysis assumes that the demands for additional teachers and facilities without the proposed action will be met.

HEALTH SERVICES

According to the 1978 New Mexico Health Resources Registry, primary care facilities and dental care were considered to be adequate in the study area. According to local officials and health service administrators, the number of physicians in the greater Farmington area is adequate to serve current needs. To maintain this level of service, the study area would need 16 additional primary care physicians by 1990 and 5 more by 2000, for a total of 81 (see Table 3-34). This analysis assumes the required number of physicans would be hired.

In 1981 there were 29 dentists practicing in Farmington, 3 in Aztec, and one in Bloomfield. Projected need is for a total of 45 dentists in 1990 and 49 by the year 2000, if present per capita

Table 3-34. PROJECTED HEALTH CARE REQUIREMENTS WITHOUT PROPOSED ACTION (BASELINE 1), STUDY AREA: 1985-2000

Item	1985	1990	1995	2000
Hospital Beds[a]	106	120	122	129
Hospital Beds[b]	122	138	140	148
Primary Care Physicians[c]	67	76	77	81
Ambulance/Rescue Vehicles	10	11	11	12
Dentists	40	45	46	49

Source: Adcock and Associates, Inc. 1982.

[a] Occupied beds.

[b] Occupied beds plus 15 percent vacancy rate.

[c] Nonfederal physicians.

service levels are to be maintained. This analysis assumes that the demand for additional dentists without the proposed action will be met.

Because of its location in Farmington, the San Juan Regional Medical Center is the medical facility most likely to be affected by the construction and operation of the proposed action. This 144-bed center had an occupancy rate of 66 percent in 1981. The Medical Center has a capacity to expand to 250 beds, which would be adequate to meet projected demand beyond the year 2000 (see Table 3-34). This analysis assumes that the medical center will be expanded as required to meet increased demand without the proposed action.

HUMAN SERVICES

The majority of human services providers in the study area have offices in Farmington. Services to places outside the city are typically provided by the Farmington offices, which are sometimes supplemented with a branch office or clinic site in Aztec or Bloomfield. Table 3-35 provides a list of the major human services agencies in the study area in 1981 and summarizes information on staffs, case loads, facilities, capacities, and funding. Nearly all of the service agencies listed consider themselves to be operating at or near capacity. The majority also view their future levels and patterns of services as unpredictable because of uncertainties in funding. Demand for human services generally seems to increase not only as population grows, but also as unemployment increases. In periods of high employment and economic opportunity, demand for alcoholism treatment, child abuse, mental health, rape, welfare, and job placement services generally decreases. It is anticipated that demand for human services in the area would increase in 1983-84, when several major construction projects would be completed, resulting in increased unemployment. For the same reason, demand for these

Table 3-35. HUMAN SERVICES, STUDY AREA: 1981

Counseling, Protective and Emergency Care	Services	Staff	Clients	Facilities	Staff: Client Capacity	Primary Funding
San Juan Mental Health Services, Inc.	Comprehensive mental health care, including 24-hour sexual assault hot line, counseling, residential treatment for emotionally disturbed youth, juvenile lisison with schools, psychiatric services, day treatment, home and nursing home visits, forensic evaluation, first-offender's program.	26	500/mo.	Crowded	Near Capacity	State
Family Crisis Center	24-hour hotline, crisis intervention, protective shelter, counseling services for entire family on individual basis initially, transportation.	10	As many as possible	New; Adequate	At Capacity	State
Self-Help, Inc.	Outpatient drug counseling, drug-prevention programming and education; family and individual counseling; crisis intervention and short-term emotional support.	3	70/mo.	Adequate	At Capacity	Private
Totah Council in Alcoholism	On-site counseling; outpatient assistance to persons returning from treatment; outreach, follow-up, information and referral.	3	60/mo.	Adequate	At Capacity	State
San Juan County Legal Services	Noncriminal representation for domestic law, landlord-tenant problems, consumer problems, and administrative law (food stamps, welfare, etc.)	2	As many as possible	Adequate	Large Waiting List	Federal
N.M. Dept. Human Services: Income Support Division	Income support: AFDC, food stamps, general assistance to temporarily and permanently disabled adults, medical assistance to Title XIX eligible and to seriously ill, assistance to nursing home residents.	41	4800/mo.	Crowded	Near Capacity	State
N.M. Dept. Human Services: Social Services	Services offered: adoption; protective services to children and adults; family planning counseling; information and referral; substitute care services for children when they are related to protective servcies; counseling for improved family and individual functioning; day care for children of working, training or incapcitated parents; early periodic screening diagnosis and treatment support services; health support services to assist clients in identifying health problems and obtaining appropriate treatment (only provided in conjunction with another service); homemaker service; problem pregnancy services, youth services (counseling).	26	450/mo.	Adequate	Near Capacity	State
Eastern Navajo Agency: Social Services	Protective services to Navajo children; emergency shelter and foster care; services to developmentally disabled; aging services for home and institutionalized patients; evaluation services for courts and other agencies; limited family and marital counseling and youth services.	6	N/A	Adequate	Near Capacity	Federal
San Juan Catholic Charities	Advocacy services; budget planning; client interviews for social assistance; emergency food bank; thrift store; utilities service program; support groups for separated or divorced; community development (e.g., Big Brothers/Big Sisters); religious articles program.	4	675/mo.	Inadequate	At Capacity	Private

Table 3-35. HUMAN SERVICES, STUDY AREA: 1981 (continued)

Counseling, Protective and Emergency Care	Services	Staff	Clients	Facilities	Staff: Client Capacity	Primary Funding
Salvation Army	Crisis intervention counseling; emergency assistance (clothing, food, lodging, limited transportation); disaster services; thrift store; friendly visitation; missing persons bureau; emergency counseling to prisoners/families; counseling for terminally ill; religious and character-building programs.	7	144/mo.	Inadequate	At Capacity	Private
LDS Social Services	Unwed parent services; licensed adoption agency; foster care; family and individual counseling.	2	N/A	Very Good	Near Capacity	Private
Services for Handicapped Persons						
N.M. Division of Vocational Rehabilitation	Medical diagnosis; medical, surgical, psychiatric, and hospital services; artificial limbs and other prosthetics; counseling and guidance; vocational and academic training; tools, equipment and licenses; selective placements.	4	200/mo.	Adequate	At Capacity	State
Association for Services to the Handicapped	Educational services and physical therapy: early infant stimulation for diagnosed disabilities, preschool for disabled, follow-up for school-age disabled; adult programs; evaluation and workshops.	14	60/mo.	Inadequate	Capacity Waiting List	Private
Easter Seal Society of New Mexico	Equipment (hospital beds, wheelchairs, walkers, etc.) and patient assistance.	1	Few	None	Expansion Planned	Private

Table 3-35. HUMAN SERVICES, STUDY AREA: 1981 (continued)

Family Planning, Prenatal and Child Support	Services	Staff	Clients	Facilities	Staff: Client Capacity	Primary Funding
San Juan Birthright, Inc.	Counseling; assistance with maternity and baby clothes; job-finding assistance for pregnant women; information and referrals; community education.	Volunteer	12/mo.	Inadequate	At Capacity	Private
San Juan County Field Health Office: Family Planning Clinic	All contraceptive services and supplies; screening, pelvic and breast exams, pregnancy testing; home visits, referrals, follow-ups.	4	800/mo.	Crowded	Near Capacity	State
Childhaven, Inc.	Emergency shelter for children in need of temporary care because of child abuse, neglect, abandonment, or other social problems.	10	55/mo.	Adequate	Near Capacity	Private
Children, Inc.: American Indian Division	Monthly subsidies for eligible children of low-income families.	1	2500/yr.	Adequate	Can Handle More	Private
Employment Assistance						
N.M. State Employment Service	Vocational counseling and testing; unemployment insurance; employer relations; job placement and job development; on-the-job training; youth counseling and placement; CETA programs; food stamps; job development and registration; Job Corps recruitment and referral; Targeted Job Tax Credit program; referral.	14	7500/yr.	Inadequate	Near Capacity	State
National Indian Youth Council—San Juan County Field Office	Classroom training (GED, ESL, remedial, other); CETA-funded work-experience program; job development and job placement.	5	163/qtr.	Adequate	Below Capacity	Federal
Eastern Navajo Agency: Employment Assistance	Testing and counseling for career development; adult vocational training; relocation assistance.	3	125/mo.	Adequate	Below Capacity	Federal

Table 3-35. HUMAN SERVICES, STUDY AREA: 1981 (concluded)

Community Development and Improvement	Services	Staff	Clients	Facilities	Staff: Client Capacity	Primary Funding
San Juan County Economic Opportunity Council	Head Start; day care for single heads of households; youth development programs; community food and nutrition programs; alternative-energy programs; other community organization and action programs.	35	Several thousand/ year			Private Federal
N.M. Health & Environment Dept: Health Services Division	Preventive health (immunizations, blood pressure, v.d. screening, cancer screening, well-child services, smoking cessation, nutrition, etc.); treatment of communicable diseases; health education for groups.	18	23,000/ year	Adequate	At Capacity	State
N.M. Health & Environment Dept: Enviornmental Improvement Division	Enforcement of state regulations covering liquid waste, solid waste, water supply, food and food service, swimming pools and public baths; permitting and inspection of liquid waste disposal problems and of food service establishments; insect and rodent control programs, citizen complaint investigations.	5	As many as possible	Adequate	At Capacity	State
American Red Cross: San Juan County Chapter	Instruction (first aid and cardiopulmonary resuscitation); disaster and relief services.	1	As needed	Adequate	Near Capacity	Private

Source: Adcock and Associates, Inc. 1981.

Note: N/A = not available.

services is expected to rise between 1991 and 1993. It is often the case that human services agencies in relatively rapidly growing areas are strained and this situation is made worse by the fact that need usually must be demonstrated before funding for new facilities or staff can be obtained. The current outlook for federally funded programs in particular is not optimistic. In a "worst-case" situation, significant shortfalls of human services would be experienced in the study area over the next few decades, resulting in larger caseloads and/or unmet demand as budget cuts result in an inability of agencies to supply the services required.

LAW ENFORCEMENT

Law enforcement in the study area is provided by several agencies. These include the New Mexico State Police Department, the San Juan County Sheriff's Office, and the Farmington, Aztec, and Bloomfield police departments.

New Mexico State Police Department

The New Mexico State Police Department has jurisdictional authority over non-Reservation areas in San Juan County. In 1981, the district headquarters in Farmington (District No. 10) was operating 1 officer short of its authorized staff of 23 (4 of whom served the Cuba area in Sandoval County). As shown in Table 3-36, without the proposed action, it is estimated that the state police would need a total of 24 officers by 1990, and a total of 26 by the year 2000 for the non-Reservation portion of the county.

San Juan County Sheriff's Office

The San Juan County Sheriff's Office, based in Aztec, serves four districts: Farmington, Aztec, Bloomfield, and Kirtland. In 1981, the office was operating with 11 support staff, 25 commissioned officers

(2 officers short of the total number required for maintaining an adequate level of service), and 29 patrol vehicles. In addition, the county's detention facility employed 17 persons. According to population projections without the proposed action, it is estimated that a total of 34 officers would be required by the year 2000 in order to maintain 1981 per capita service levels (see Table 3-36). In addition, it is estimated that 8 more patrol vehicles would be needed. The new detention center, scheduled to open in 1982, is projected to be adequate through the year 2000.

Farmington Police Department

At the end of 1980, the Farmington Police Department had a total of 78 officers (compared with an authorized strength of 81). In addition, there were 18 reserve officers, 41 staff, and 16 school cross walk guards for a total of 153 employees. It is estimated that a total of 115 officers would be needed by 1990, and 8 additional officers by the year 2000, to maintain present service levels as population increases without the proposed action (see Table 3-37). Meeting these manpower needs should be facilitated by the police academy in Farmington.

Aztec Police Department

In 1980, the Aztec Police Department consisted of 13 uniformed officers (although 14 were authorized) and 5 support staff. In addition, 11 vehicles were operated for local patrols. Based on population projections without the proposed action, it is estimated that the department would need 18 officers from 1990 through the year 2000 (see Table 3-37).

Bloomfield Police Department

In 1980, the Bloomfield Police Department had an authorized strength of 12 officers, and maintained 12 vehicles. Based on

Table 3-36. PROJECTED LAW ENFORCEMENT AGENCY POLICE OFFICER REQUIREMENTS, STUDY AREA: 1985-2000

Agency	1981[a]	1985	1990	1995	2000
New Mexico State Police[b]	19	21	24	24	26
San Juan County Sheriff's Office	27	29	31	32	34
Farmington Police Department	81[c]	98	115	116	123
Aztec Police Department	14	16	18	18	18
Bloomfield Police Department	12	14	15	15	16

Sources: Adcock and Associates, Inc. 1982.

[a] Authorized staff level.

[b] Nonreservation portion of San Juan County.

[c] 1980 data.

Table 3-37. PROJECTED FIRE DEPARTMENT NEEDS WITHOUT PROPOSED ACTION (BASELINE 1), STUDY AREA: 1985-2000

Agency	1981[a]	1985	1990	1995	2000
Farmington Fire Department					
Firefighters[b]	79	90	105	107	113
Response Vehicles	15	17	20	20	21
Fire Stations	5	6	7	7	7
Aztec Fire Department					
Firefighters[b]	35	39	44	44	46
Response Vehicles	5	6	6	6	6
Fire Stations	2	2	2	2	3
Bloomfield Fire Department					
Firefighters[b]	33	36	40	41	43
Response Vehicles	7	8	9	9	9
Fire Stations	1	1	1	1	1
San Juan County Fire Department					
Firefighters[b]	230	246	265	271	287
Response Vehicles	29	31	33	34	36
Fire Stations	11	12	13	13	14

Sources: Adcock and Associates, Inc. 1982.

[a] Actual number.

[b] Entries are number of volunteer firefighters.

population projections without the proposed action, it is estimated that the department would require 3 additional police officers by 1990, and 1 more by the year 2000 (see Table 3-36).

Summary

This analysis assumes that each law enforcement agency will meet the demand for additional personnel required under Baseline 1. It is also assumed that the necessary patrol vehicles and other required law enforcement equipment will be provided.

FIRE PROTECTION

Fire protection in the study area is provided by the Farmington, Aztec, Bloomfield, and San Juan County fire departments. Table 3-37 summarizes current and projected needs for fire protection service in the study area.

Farmington Fire Department

In 1981, there were 5 fire stations, 7 pumper trucks, 2 ladder trucks, 2 crash vehicles for airport emergencies, 2 rescue vehicles, and 2 brush vehicles for off-road use in the Farmington Fire Department. The professional staff totaled 79 persons: 3 chiefs and 76 officers/firefighters. Department equipment was considered to be in excellent condition; the staff was also considered adequate for both current and projected near-term needs. However, without the proposed action, Farmington is expected to need 34 additional firefighters, 6 more response vehicles, and 2 new substations by the year 2000 in order to maintain 1981 per capita service levels (see Table 3-37).

Aztec Fire Department

In 1981, the Aztec Volunteer Fire Department operated with 35 volunteer firefighters, 2 fire stations, 5 pumper trucks, and 1 rescue unit. Department service was considered adequate; equipment was rated as being in excellent condition. Based on population projections without the proposed action, the need for volunteer firefighters is estimated to increase to 44 in 1990 and 46 by the year 2000. With the addition of 1 more response vehicle by 1985, and 1 additional substation by the year 2000, department needs could be met throughout the project period (see Table 3-37).

Bloomfield Fire Department

In 1981, the Bloomfield Fire Department had 1 full-time fire chief and 32 volunteers, who operated 7 response vehicles out of 1 new station. With the addition of a new tanker vehicle scheduled for purchase in 1982, the department would be considered adequately equipped and staffed. Projected population growth without the proposed action is estimated to create the need for 10 additional firefighters and 2 more response vehicles by the year 2000 (see Table 3-37).

San Juan County Fire Department

In 1981, the San Juan County Fire Department operated 11 fire stations in the non-Reservation portion of the study area located outside the jurisdiction of the municipal fire departments. In addition, the department maintained a total of 29 fire response vehicles, employed 3 full-time staff, and maintained 230 volunteer firefighters. To keep pace with the needs arising from the increased population projected to occur without the proposed action, it is estimated that the department would need 7 additional vehicles, 3 additional fire stations (including 2 proposed for construction in 1982), and 57 additional volunteers by the year 2000 (see Table 3-37).

This analysis assumes that each fire protection agency will meet the demand for additional personnel required under Baseline 1. It is also assumed that the necessary response vehicles and fire station facilities will be provided.

TRANSPORTATION

For a discussion of transportation resources in the study area, see the Transportation Technical Report.

COMMUNITY RECREATION

Table 3-38 summarizes major community recreation facilities (including school facilities) available in Farmington, Aztec, and Bloomfield in 1981. Projected additional needs for selected recreation facilities without the proposed action are presented for the study area in Table 3-39. These projections are based on demand estimates derived from per capita standards which were compared with the current supply of facilities in the three communities. They are meant to provide a general indication of the future need for recreation facilities. Supply of and demand for selected facilities are discussed below by community.

Farmington

Farmington has over 250 acres of developed park land, including 107 acres of neighborhood parks, district parks, and athletic fields. A standard developed by the Farmington Parks and Recreation Department indicates that 3.75 acres of these types of parks should be available for each 1,000 residents. According to this standard, Farmington's current supply of neighborhood and district parks and athletic fields is about 10 acres short of being adequate.

With projected population growth without the proposed action, 60 additional acres would be needed by 1990, and 71 acres by the year

Table 3-38. MAJOR RECREATION FACILITIES, SELECTED STUDY AREA COMMUNITIES: 1981

Facility[a]	Farmington	Aztec	Bloomfield
Acres of Developed Park Lands	250	62	8.5
Softball/Baseball Fields	12	6	10
Football/Soccer Fields	5	3	4
Public Golf Courses	1	1	0
Handball/Racquetball Courts	5	0	0
Tennis Courts	19	4	3
Outdoor Theaters	1	0	0
Neighborhood Playgrounds	4	6	5
Gymnasiums	6	1	5
Running Tracks	1	2	3
Bowling Alleys	2	0	0
Skating Rinks	2	0	0
Automobile/Motorcycle Race Tracks	1	2	0
Movie Theaters	6	1	0
Swimming Pools	2	1	1

Source: Adcock and Associates, Inc., 1982.

[a] School facilities are included.

Table 3-39. PROJECTED COMMUNITY RECREATION FACILITY REQUIREMENTS WITHOUT PROPOSED ACTION (BASELINE 1), STUDY AREA: 1981-2000

	1981	1985	1990	1995	2000
Park Land[a]	0	10	39	42	54
Tennis Courts	0	0	0	0	0
Swimming Pools[b]	2,600	5,300	8,650	9,100	10,700
Picnic Tables	6	24	46	49	60
Golf Course Holes	2	5	8	8	10
Racquetball Courts	0	0	0	0	0

Source: Adapted from Adcock and Associates, Inc. 1982.

[a] Includes acres of developed neighborhood parks, athletic fields, and district parks for Farmington, Aztec, and Bloomfield only.

[b] Square feet of swimming pool surface area--includes facilities operated by municipal school districts that are available for public use.

2000. Farmington Parks and Recreation Master Plan notes that 25 acres of land have been set aside for park development by 1985. This would eliminate the current short fall and accommodate projected needs in 1985, after which the city would need to develop an average of approximately 3 acres of park land per year to meet projected demand.

Based on supply and demand data, there seems to be an adequte number of tennis courts for the local population beyond 1995. However, if the popularity of tennis continues to increase, new facilities may be needed as early as 1990.

Farmington residents' top recreation priority, according to recent survey data, is for more swimming facilities. The two existing facilities were operating at or very near capacity in 1981, and could not accommodate current and projected demand. To alleviate this situation, the city of Farmington is proposing to construct a new complex with an Olympic-size pool, which would meet projected demand beyond the turn of the century.

Although there is projected demand for more local picnic facilities, access to nearby state and federal parks provides more opportunities of this nature. While there is also a projected need for golf facilities, the availability of a private country club in Farmington can relieve strain on public facilities until they are expanded. The City of Farmington is currently developing a network of bicycle trails in the area, in response to demand.

Bloomfield

The City of Bloomfield currently has one developed and one partially developed park, and an estimated shortfall of about 10 acres of developed park land, based on per capita standards. Projected demand is for a total of 15 more acres by 1990, and 17 acres by 2000. The city has reserved a 150-acre site for future park development, ensuring the potential to meet future park needs in the community.

Bloomfield's tennis and swimming facilities are adequate to meet current and projected demand to the year 2000. There are no racquetball facilities in the community, but Bloomfield Municipal Schools provide additional recreation opportunities to residents.

Aztec

The City of Aztec contains 62 acres of developed park land, which is more than adequate to meet current and projected needs (based on the 3.75 acres per 1,000 population standard established by Farmington). Aztec's tennis and swimming facilities appear to be adequate to meet projected demand through the year 2000, although racquetball courts may be needed in the near future. Aztec Municipal Schools provide further recreation opportunities to local residents.

This analysis assumes that each community will meet the demand identified for additional recreation facilities without the proposed action.

4.0
ENVIRONMENTAL CONSEQUENCES

INTRODUCTION AND SUMMARY

In this section, potential social and economic consequences of the proposed action are identified. Projections of population, employment, government revenues and expenditures, and community facilities and services are made for project-related direct and indirect growth. These projections are then compared with the projections presented in Section 3.0 for the projected existing environment that included Baseline 1 projects but excluded the proposed action. The significance of the potential impacts identified is addressed. This section focuses on population impact issues in the greater Farmington area; for an analysis of potential impacts to traditional Navajo values and lifestyles, refer to Appendix D.

The majority of potential social and economic impacts associated with the proposed action would result from the construction and operation of the generating station, since transmission line and pipeline work forces are relatively small and would be in the area for a short time. Potential social and economic impacts that would result from construction of the transmission lines and pipelines are identified in the last two subsections.

Acceleration in growth due to major energy development projects is not a new pattern in northern San Juan County, as history will attest. As much as local residents would like to stabilize the regional economy, it has gone through many cycles of rapid growth and population expansion, followed by economic decline and population loss. For the most part, the proposed action is viewed as a means of boosting the local economy.

Impacts have been projected annually from 1985, the initial year of proposed construction activity, to the year 2000. The projected project impacts are compared with anticipated growth trends without the project. As will be seen, the proposed action would cause a slight acceleration in projected growth rates, and it would increase demand for some community facilities and services so that a new school or a new water treatment plant, for example, might be needed one or two years earlier than it would have been without the project.

In many ways, the impacts of the proposed action would follow patterns that have become established in the region. It would provide local employment opportunities, boost personal income and business receipts, and attract new population--mostly Anglos--who would increase demand for community facilities and services, and also expand the local tax base.

The cumulative effects of planned energy development projects throughout the rest of this century could have some adverse effects on some segments of the local population. The cost of housing and services, for example, would probably rise as demand increases. This would be particularly hard for some individuals on fixed incomes. Some small businesses would find it difficult to compete for labor. Local minority groups could have a growing sense of relative deprivation as Anglos grow in number and in economic and political strength in the area. Navajos in particular may become discouraged if newcomers display little understanding or appreciation of their traditional culture. This problem, of course, would be exaggerated if Navajos do not benefit from new employment opportunities.

Few of the potential social and economic impacts projected for the proposed action would be of such magnitude, intensity, or duration that they could be justifiably called "significant." The project would, however, cause some changes--both beneficial and adverse--in social and economic conditions in the affected environment. These are described in the sections to follow.

POPULATION

As shown in Table 4-1, the construction and operation of the proposed action would result in population increases in San Juan County and the study area communities beyond those projected with Baseline 1. Based on the proposed project schedule, the largest impact would occur in 1995, when project construction would result in an increase of 3,075 persons (or 4.1 percent) above the projected Baseline 1 population of 75,750. The largest estimated project-related increase would occur in the city of Farmington.

Potential population impacts associated with the construction and operation of the proposed action would be reduced in some years because work on other projects in the region would be decreasing while work on the proposed action would be expanding. For example, in 1995, the proposed action would employ an estimated 1,030 construction workers and 650 operation workers (an increase of approximately 360 total workers from 1994). Construction employment associated with Baseline 1 activities is projected to be decreasing during that time period. As a result, the proposed action would create additional jobs for local workers who would otherwise have become unemployed. Thus, because local labor is assumed to be available, the in-migration of

Table 4-1. POPULATION PROJECTIONS WITH AND WITHOUT PROPOSED ACTION, SAN JUAN COUNTY AND STUDY AREA COMMUNITIES: 1985-2000

	San Juan County			Farmington			Aztec		
Year	Without	With	Percent Change	Without	With	Percent Change	Without	With	Percent Change
1985	93,700	93,800	0.1	38,000	38,050	0.1	6,350	6,350	0.0
1986	95,300	96,050	0.8	39,050	39,500	1.2	6,550	6,600	0.8
1987	97,200	99,550	2.4	40,250	41,625	3.4	6,650	6,825	2.6
1988	98,900	101,150	2.3	41,300	42,650	3.3	6,750	6,925	2.6
1989	101,400	103,100	1.7	42,800	43,800	2.3	7,000	7,125	1.8
1990	103,600	106,050	2.4	44,250	45,675	3.2	7,250	7,425	2.4
1991	102,600	105,400	2.7	43,450	45,100	3.8	6,900	7,100	2.9
1992	103,800	106,900	3.0	44,000	45,825	4.1	7,100	7,325	3.2
1993	103,700	106,600	2.8	43,750	45,450	3.9	6,950	7,175	3.2
1994	104,700	107,400	2.6	44,300	45,875	3.6	7,150	7,350	2.8
1995	106,200	109,600	3.2	44,800	46,775	4.4	7,250	7,500	3.4
1996	107,500	110,650	2.9	45,150	47,000	4.1	7,300	7,525	3.1
1997	109,100	111,500	2.2	45,750	47,150	3.1	7,400	7,575	2.4
1998	110,100	112,500	2.2	46,300	47,700	3.0	7,450	7,625	2.3
1999	111,400	113,850	2.2	46,800	48,200	3.0	7,450	7,625	2.3
2000	112,700	115,150	2.2	47,350	48,750	3.0	7,550	7,725	2.3

Table 4-1. POPULATION PROJECTIONS WITH AND WITHOUT PROPOSED ACTION, SAN JUAN COUNTY AND STUDY AREA COMMUNITIES: 1985-2000 (concluded)

	Bloomfield			Flora Vista			Lee Acres			Lower Valley		
Year	Without	With	Percent Change	Without	With	Percent Change	Without	With	Percent Change	Without	With	Percent Change
1985	5,750	5,750	0.0	4,400	4,400	0.0	5,350	5,350	0.0	5,800	5,800	0.0
1986	5,700	5,750	0.9	4,500	4,550	1.1	5,450	5,500	0.9	5,550	5,600	0.9
1987	5,950	6,100	2.5	4,600	4,725	2.7	5,550	5,700	2.7	5,650	5,800	2.7
1988	6,050	6,200	2.5	4,650	4,775	2.7	5,650	5,800	2.7	5,750	5,900	2.6
1989	6,400	6,500	1.6	4,800	4,900	2.1	5,800	5,900	1.7	5,900	6,025	2.1
1990	6,350	6,500	2.4	4,950	5,075	2.5	5,950	6,100	2.5	6,000	6,150	2.5
1991	6,300	6,475	2.8	4,750	4,900	3.2	5,800	5,975	3.0	6,000	6,175	2.9
1992	6,350	6,550	3.1	4,850	5,025	3.6	5,900	6,100	3.4	6,000	6,200	3.3
1993	6,450	6,650	3.1	4,800	4,950	3.1	5,900	6,100	3.4	6,000	6,175	2.9
1994	6,300	6,475	2.8	4,950	5,100	3.0	5,950	6,125	2.9	6,100	6,275	2.9
1995	6,500	6,725	3.5	5,000	5,175	3.5	6,050	6,275	3.7	6,150	6,375	3.7
1996	6,550	6,750	3.1	5,050	5,225	3.5	6,150	6,350	3.3	6,250	6,450	3.2
1997	6,800	6,950	2.2	5,100	5,225	2.5	6,250	6,400	2.3	6,300	6,450	2.4
1998	6,550	6,700	2.3	5,200	5,325	2.4	6,250	6,400	2.3	6,400	6,550	2.3
1999	6,750	6,900	2.2	5,250	5,375	2.4	6,350	6,500	2.4	6,450	6,600	2.3
2000	6,850	7,000	2.2	5,300	5,425	2.4	6,450	6,600	2.3	6,550	6,700	2.3

Source: Adcock and Associates, Inc., 1982.

new workers and their families to the area would be substantially reduced.

The threshold selected to indicate significance of population impacts is an annual growth rate of 10 percent or more (see Section 2.0). None of the affected communities is projected to reach an annual growth rate of 10 percent, either with or without the proposed action.

ECONOMY AND EMPLOYMENT

Project-related employment is comprised of direct jobs (jobs held by persons employed in the construction and operation of the proposed action) and indirect jobs (jobs resulting from the flow of money through the study area economy from purchases of project-related equipment, materials, and services, and from worker expenditures). Indirect jobs were computed using a multiplier derived from an input-output model based on a two-county regional impact area (see Appendix A for additional information). Therefore, the indirect jobs generated from project-related construction and operation activity are assumed to occur throughout the two-county area. Nonetheless, they would be concentrated in the greater Farmington area.

As shown in Table 4-2, the total number of direct construction and operation jobs would peak in 1992 with 1,804 workers. Indirect project-related jobs would also peak in 1992 with 1,965 workers. Total annual new jobs created by the proposed action would increase to an estimated 3,041 in 1987 and then would decrease significantly during the next two years. In 1990, with the start of construction of Unit 3 and continued construction of both Units 1 and 2, the total number of new annual jobs would increase to 2,769. This increase would continue through 1992, followed by substantial decreases in

Table 4-2. PROJECTED DIRECT AND INDIRECT JOBS DUE TO CONSTRUCTION AND OPERATION OF PROPOSED ACTION: 1985-2000

	1985	1986	1987	1988	1989	1990	1991	1992
Construction								
Direct Jobs	85 (+85)	800 (+715)	1630 (+830)	1505 (-125)	914 (-591)	1080 (+166)	1320 (+240)	1530 (+210)
Indirect Jobs	92 (+92)	610 (+518)	1411 (+801)	1383 (-28)	951 (-452)	1223 (+272)	1375 (+152)	1601 (+226)
Subtotal	177 (+177)	410 (+1233)	3041 (+1631)	2888 (-153)	1865 (-1023)	2303 (+438)	2695 (+392)	3131 (+436)
Operation								
Direct Jobs	0	0	0	0	30 (+30)	200 (+170)	250 (+50)	274 (+24)
Indirect Jobs	0	0	0	0	40 (+40)	266 (+266)	332 (+106)	364 (+32)
Subtotal	0	0	0	0	70 (+70)	466 (+396)	58 (+156)	638 (+56)
Construction & Operation								
Direct Jobs	85 (+85)	800 (+715)	1630 (+830)	1505 (-125)	944 (-561)	1280 (+336)	1570 (+290)	1804 (+234)
Indirect Jobs	92 (+92)	610 (+518)	1411 (+801)	1383 (-28)	991 (-412)	1489 (+538)	1707 (+258)	1965 (+258)
Total	177 (+177)	1410 (+1233)	3041 (+1631)	2888 (-153)	1935 (-953)	2769 (+834)	2753 (+548)	3769 (+492)

Source: Direct jobs data supplied by the Public Service Company of New Mexico.
Indirect jobs estimated by Adcock and Associates, Inc.

Note: Parentheses indicate annual change in number of jobs available.

Table 4-2. PROJECTED DIRECT AND INDIRECT JOBS DUE TO CONSTRUCTION AND OPERATION OF PROPOSED ACTION: 1985-2000 (concluded)

	1993	1994	1995	1996	1997	1998	1999	2000
Construction								
Direct Jobs	1090 (-440)	838 (-252)	1030 (+192)	775 (-255)	255 (-520)	95 (-160)	0 (-95)	0
Indirect Jobs	1233 (-368)	898 (-335)	1147 (+249)	913 (-234)	398 (-515)	169 (-229)	0 (-169)	0
Subtotal	2323 (-808)	1736 (-587)	2177 (+441)	1688 (-489)	653 (-1035)	264 (-389)	0 (-264)	0
Operation								
Direct Jobs	410 (+136)	480 (+70)	650 (+170)	700 (+50)	724 (+24)	860 (+136)	900 (+40)	900 (0)
Indirect Jobs	545 (+181)	638 (+93)	864 (+226)	931 (+67)	963 (+32)	1144 (+181)	1197 (+53)	1197 (0)
Subtotal	955 (+317)	1118 (+163)	1514 (+396)	1631 (+117)	1687 (+56)	2004 (+317)	2097 (+93)	2097 (0)
Construction & Operation								
Direct Jobs	1500 (-304)	1318 (-182)	1680 (+362)	1475 (-205)	979 (-496)	955 (-24)	900 (-55)	900 (0)
Indirect Jobs	1778 (-187)	1536 (-242)	2011 (+475)	1844 (-167)	1361 (-483)	1313 (-48)	1197 (-116)	1197 (0)
Total	3278 (-491)	2854 (-424)	3691 (+837)	3319 (-372)	2340 (-979)	2268 (-72)	2097 (-171)	2097 (0)

Source: Direct jobs data supplied by the Public Service Company of New Mexico.
Indirect jobs estimated by Adcock and Associates, Inc.

Note: Parentheses indicate annual change in number of jobs available.

construction-related employment in 1993 and 1994. In 1995, total employment would increase substantially due to Unit 4 construction. After 1995, total project-related jobs would decrease once again, stabilizing at approximately 2,100 in 1998.

It is extremely difficult to estimate Navajo direct employment impacts from NMGS. It is unknown how many jobs Navajos would be qualified for, and it is unknown how many Navajos would apply for those jobs. However, the employment history of the area offers some insight. The Four Corners Power Plant, on Navajo land, had a commitment to preferential hiring of qualified Navajos. At the Four Corners plant there were many Navajo applicants, and a large percentage (approximately 50 percent) were hired. At the San Juan Generating Station there was no commitment to Navajo hiring preference and relatively few applicants; thus fewer Navajo jobs (less than 10 percent) resulted. It may be assumed, therefore, that if no preference were given to Navajo hiring, there would be few Navajos employed. If, on the other hand, the applicant were committed to Navajo hiring preference, a large percentage of total project jobs would be held by Navajos. Indirect or secondary employment in the local economy may follow past patterns of relatively few off-Reservation jobs being held by Navajos. (See Appendix D for further details on potential Navajo employment impacts.)

PERSONAL INCOME

Direct and indirect personal income would expand the economy of the study area and the study region. As construction begins in 1985, \$2.6 million in direct personal income would be generated as a result of expenditures for wages and salaries. An additional \$1.1 million would be generated through expenditures for materials and services and through spending by construction workers (see Table 4-3). Between

Table 4-3. PROJECTED PERSONAL INCOME DUE TO CONSTRUCTION AND OPERATION OF PROPOSED ACTION, SAN JUAN AND MCKINLEY COUNTIES: 1984-2000 (thousands of constant 1980 dollars)

	Construction			Operation			
	Direct[a]	Indirect[b]	Total	Direct[a]	Indirect[b]	Total	Total
1984[c]	-	39	39	-	-	-	39
1985	2,600	1,111	3,711	-	-	-	3,711
1986	24,469	6,888	31,357	-	-	-	31,357
1987	49,855	16,374	66,229	-	-	-	66,229
1988	46,032	16,218	62,250	-	-	-	62,250
1989	27,956	11,362	38,318	441	828	1,269	40,587
1990	33,033	14,814	47,847	2,937	4,142	7,079	54,926
1991	40,374	16,455	56,829	3,671	5,178	8,849	65,678
1992	46,797	19,175	65,972	4,024	5,675	9,699	75,671
1993	33,339	14,942	48,281	6,021	8,491	14,512	62,793
1994	25,631	10,780	37,411	7,049	9,941	16,990	54,401
1995	31,504	13,917	45,421	9,546	13,462	23,008	68,429
1996	23,704	11,143	34,847	10,280	14,498	24,778	59,625
1997	7,799	4,990	12,789	10,632	14,995	25,627	38,416
1998	2,906	2,109	4,015	12,630	17,811	30,441	34,456
1999	-	-	-	13,217	18,640	31,857	31,857
2000	-	-	-	13,217	18,640	31,857	31,857
Total	395,999	160,317	556,316	NA	NA	NA	NA

Source: Adcock and Associates, Inc. 1982.

Data sources: [a] Based on PNM employment and wage data.

[b] Estimated by Adcock and Associates, Inc., based on regional input/output model.

[c] Indirect personal income in 1984 represents purchases of equipment and materials in the study region prior to actual construction activity.

Note: NA = not applicable.

1987 and 1995, construction-related personal income would average over $52 million. Throughout the 14-year construction period, direct expenditures for wages and salaries would total approximately $396 million in personal income. Moreover, an additional $160.3 million of indirect personal income would also be generated for an estimated total personal income of $556.3 million. Annual personal income during the operation period would increase steadily to a total of over of $30 million in 1998. The combined impact of the construction and operation periods would peak in 1992. During that year, an estimated $75.7 million in personal income would be generated. After 1992, project-related personal income would decrease to $31.9 million in 1999.

The relative impact of new personal income to the two-county area is not expected to be a significant increase. Personal income due to the proposed action would be approximately 0.3 percent of the total personal income generated in the area in 1985. Total personal income from project construction and operation would be about 5.4 percent in 1989, would peak at 5.8 percent in 1992, and would drop to 2.2 percent in the year 2000. While the proposed action would not significantly affect the region's total income, the project would add over $780 million in direct and indirect personal income. Because of the significant percentage of project-related workers who would choose to live in the greater Farmington area and because of the availability of goods and services for project construction and operation and for project-related workers, it is estimated that the greater Farmington area would receive the major share (approximately 75 percent) of the project-related personal income generated in the two-county region.

PUBLIC FINANCES

Farmington

As shown in Table 4-4, construction and operation of the proposed

Table 4-4. PROJECTED EFFECTS OF PROPOSED ACTION ON FARMINGTON OPERATING FUNDS: 1985-2000 (thousands of constant 1980 dollars)

Fiscal Year:	1985	1986	1987	1988	1989	1990	1991	1992
General Fund								
Revenues								
Taxes	8	49	146	141	112	159	169	193
Charges and Miscellaneous	10	96	125	32	-12	93	42	60
Subtotal	18	145	271	173	100	252	211	254
Grants	0	0	0	0	1	1	1	1
State Shared	16	99	292	268	203	304	322	367
Subtotal	16	99	292	268	204	305	323	369
TOTAL REVENUES	34	244	562	441	305	557	534	622
Expenditures								
General Government	2	15	52	77	67	70	88	99
Public Safety	4	35	126	187	163	169	213	241
Public Works	0	4	32	98	95	73	102	118
Health and Welfare	0	0	2	6	6	4	6	7
Recreation and Culture	2	13	47	69	60	63	79	89
TOTAL EXPENDITURES	7	68	259	438	391	379	489	555
Surplus or Deficit	26	176	303	3	(86)	178	45	67
Other Operating Funds								
Revenues	0	3	11	22	41	42	37	48
Expenditures	1	6	24	43	39	37	48	55
Surplus or Deficit	0	(3)	(13)	(22)	2	5	(11)	(7)
All Operating Funds								
Revenues	34	247	573	463	346	599	571	670
Expenditures	8	74	283	481	430	415	537	610
Surplus or Deficit	26	173	290	(19)	(84)	183	34	60

Table 4-4. PROJECTED EFFECTS OF PROPOSED ACTION ON FARMINGTON OPERATING FUNDS: 1985-2000 (thousands of constant 1980 dollars) (concluded)

Fiscal Year:	1993	1994	1995	1996	1997	1998	1999	2000
General Fund								
Revenues								
Taxes	189	168	192	178	127	119	106	103
Charges and Miscellaneous	75	20	107	28	-23	36	34	38
Subtotal	265	188	299	206	104	155	140	141
Grants	1	2	1	1	2	2	1	1
State Shared	356	313	365	332	227	218	195	190
Subtotal	358	315	366	333	229	219	196	191
TOTAL REVENUES	622	503	666	540	332	374	335	332
Expenditures								
General Government	102	94	101	109	91	78	78	76
Public Safety	246	228	246	263	221	190	189	188
Public Works	131	123	112	141	130	98	99	97
Health and Welfare	8	7	7	9	8	6	6	6
Recreation and Culture	91	84	91	97	82	70	70	69
TOTAL EXPENDITURES	578	537	557	619	532	443	442	438
Surplus or Deficit	44	(34)	108	(79)	(200)	(69)	(107)	(106)
Other Operating Funds								
Revenues	52	56	55	52	58	53	43	43
Expenditures	57	53	54	62	54	44	44	43
Surplus or Deficit	(5)	2	1	(10)	4	10	(1)	(1)
All Operating Funds								
Revenues	674	558	721	591	390	427	378	375
Expenditures	636	591	611	681	586	487	486	481
Surplus or Deficit	39	(32)	109	(89)	195	(60)	(108)	(106)

Source: Adcock and Associates, Inc., 1982.

Note: Detail may not sum to total or subtotal due to rounding.
Deficits are shown in parentheses.

action is expected to generate an undiscounted cumulative net surplus in Farmington operating funds of $221,000 in constant 1980 dollars between FY 1985 and FY 2000. Nevertheless, expenditures would be greater than revenues in FY 1988, 1989, 1994, 1996, and 1998-2000, based on the proposed construction schedule.

Few significant impacts on capital spending are expected due to project-related population increases. The analysis of community facilities identified a need for one additional fire truck and about 6 acres of park land in FY 1991 as a result of the proposed action. On an annualized basis, these two items are projected to cost less than $20,000 per year. Additional sewage treatment capacity, projected to be required in FY 1989, could cost as much as $190,000 per year. However, a large portion of this could be paid for by federal and state funds resulting in a relatively small impact on the Farmington Electric, Water, and Sewer (EWS) Fund. Finally, water rights acquisition could add $80,000 or more to EWS costs.

Aztec

With the exception of FY 1997, the construction and operation of the proposed action is projected to have a positive impact on all operating funds through the year 2000 (see Table 4-5). The cumulative total from FY 1985 through FY 2000 would be about $161,000 in constant 1980 dollars. The population influx and other changes associated with NMGS are not expected to have any pronounced effect on enterprise finances at current rates and service costs. No significant capital expenditure requirements in Aztec attributable to the proposed action were identified in the analysis of community facilities and services. However, beginning about FY 1990, water rights acquisition necessitated by project-related population increase could add about $7,500 per year to Joint Utility Fund costs.

Table 4-5. PROJECTED EFFECTS OF PROPOSED ACTION ON AZTEC OPERATING FUNDS: 1985-2000 (thousands of constant 1981 dollars)

Fiscal Year:	1985	1986	1987	1988	1989	1990	1991	1992
General Fund								
Revenues								
Taxes	1	6	16	13	9	15	15	17
Charges and Miscellaneous	0	1	4	3	2	3	3	4
Subtotal	1	7	20	15	10	19	18	20
Grants	0	0	0	0	0	0	0	0
State Shared	1	8	22	17	11	20	20	22
Subtotal	1	8	22	17	11	20	20	22
TOTAL REVENUES	2	15	42	32	21	39	38	42
Expenditures								
General Government	0	1	4	6	5	5	7	8
Public Safety	0	2	7	10	8	9	11	13
Public Works	0	0	1	4	4	3	4	5
Health and Welfare	0	0	0	0	0	0	0	0
Recreation and Culture	0	1	2	3	3	3	4	4
TOTAL EXPENDITURES	0	4	14	24	21	21	26	30
Surplus or Deficit	2	11	27	8	0	19	12	12
Other Operating Funds								
Revenues	0	2	5	6	7	8	9	10
Expenditures	0	1	4	7	6	6	7	8
Surplus or Deficit	0	0	1	0	1	3	1	2
All Operating Funds								
Revenues	3	17	47	38	28	48	47	53
Expenditures	1	5	18	30	27	26	34	39
Surplus or Deficit	2	12	28	8	1	21	13	14

Table 4-5. PROJECTED EFFECTS OF PROPOSED ACTION ON AZTEC OPERATING FUNDS: 1985-2000 (thousands of constant 1981 dollars) (concluded)

Fiscal Year:	1993	1994	1995	1996	1997	1998	1999	2000
General Fund								
Revenues								
Taxes	16	15	19	15	0	10	10	9
Charges and Miscellaneous	4	3	5	3	2	3	3	3
Subtotal	20	18	24	19	12	13	12	12
Grants	0	0	0	0	0	0	0	0
State Shared	22	19	25	20	13	14	13	13
Subtotal	22	20	25	20	13	14	13	13
TOTAL REVENUES	42	38	49	39	25	27	25	25
Expenditures								
General Government	8	7	8	8	7	6	6	6
Public Safety	13	12	13	14	11	10	10	10
Public Works	6	5	5	6	6	4	4	4
Health and Welfare	0	0	0	1	0	0	0	0
Recreation and Culture	4	4	4	5	4	3	3	3
TOTAL EXPENDITURES	31	29	30	33	29	24	24	24
Surplus or Deficit	11	9	19	6	(4)	3	2	1
Other Operating Funds								
Revenues	10	10	11	11	10	9	8	8
Expenditures	9	8	9	9	8	7	7	7
Surplus or Deficit	1	2	3	1	2	3	2	2
All Operating Funds								
Revenues	52	48	60	50	35	36	34	33
Expenditures	40	37	39	43	37	31	31	30
Surplus or Deficit	12	11	22	7	(2)	6	3	3

Source: Adcock and Associates, Inc., 1982.

Note: Detail may not sum to total or subtotal due to rounding.
Deficits are shown in parentheses.

Bloomfield

The impact of the construction and operation of the proposed action on all operating funds is estimated to be positive from FY 1985 through FY 1995 (except in FY 1989) and negative thereafter, with a positive cumulative impact on operating funds of $132,000 (Table 4-6). Since the proposed action is not expected to result in a municipal enterprise customer mix that differs substantially from the mix under baseline conditions, it is not expected to adversely affect Bloomfield enterprise funds finances. No significant capital outlays were found to be required with the proposed action. Water rights acquisition could add about $7,500 per year to Water and Sewer Fund costs beginning about FY 1990.

San Juan County

The principal impact of the construction and operation of the proposed action on county finances would be on the property tax. As shown in Table 4-7, property tax receipts are projected to outweigh other impacts on the General Fund or other operating fund revenue or expenditure category. At the FY 1981 rate of $6.412 per $1000 of assessed valuation, property tax receipts would increase to $412,000 in 1990, $1.7 million in 1995, and $2.4 million in 2000. Based on past developments in other political jurisdictions, however, it can be expected that the actual impact of the proposed action would be to lower the property tax rates in the county rather than to generate huge surpluses. (The input-output analysis discussed in Appendix C assumed that tax rate reduction, rather than revenue generation, would be the principal impact of the increase in the property tax base caused by the proposed action.)

Analysis of county facilities and services did not reveal any substantial capital expenditure requirements attributable to the project. Therefore, the impact of the proposed action on county capital funds is expected to be minimal.

Table 4-6. PROJECTED EFFECTS OF PROPOSED ACTION ON BLOOMFIELD OPERATING FUNDS: 1985-2000 (thousands of constant 1981 dollars)

Fiscal Year:	1985	1986	1987	1988	1989	1990	1991	1992
General Fund								
Revenues								
Taxes	1	3	16	10	7	10	12	15
Charges and Miscellaneous	0	0	2	2	2	2	2	3
Subtotal	1	3	18	12	8	12	14	18
Grants	0	0	0	0	0	0	0	0
State Shared	1	4	22	13	8	14	16	20
Subtotal	1	4	22	13	8	14	16	20
TOTAL REVENUES	2	7	40	25	17	26	30	38
Expenditures								
General Government	0	1	5	7	6	6	8	9
Public Safety	0	2	7	10	9	9	12	13
Public Works	0	0	2	5	5	4	5	6
Health and Welfare	0	0	0	1	1	0	1	1
Recreation and Culture	0	0	0	1	0	0	1	1
TOTAL EXPENDITURES	0	4	14	23	21	20	26	29
Surplus or Deficit	1	3	26	2	(4)	6	4	9
Other Operating Funds								
Revenues	0	0	0	1	3	3	2	3
Expenditures	0	0	2	3	3	3	3	4
Surplus or Deficit	0	0	(1)	(2)	0	0	(1)	(1)
All Operating Funds								
Revenues	2	7	40	26	20	29	33	41
Expenditures	0	4	15	26	24	23	29	33
Surplus or Deficit	1	3	25	0	(4)	6	3	8

Table 4-6. PROJECTED EFFECTS OF PROPOSED ACTION ON BLOOMFIELD OPERATING FUNDS: 1985-2000 (thousands of constant 1981 dollars) (concluded)

Fiscal Year:	1993	1994	1995	1996	1997	1998	1999	2000
General Fund								
Revenues								
Taxes	16	12	14	12	7	8	7	7
Charges and Miscellaneous	3	3	3	3	2	2	2	2
Subtotal	19	14	17	15	9	10	9	9
Grants	0	0	0	0	0	0	0	0
State Shared	21	15	19	16	9	11	10	9
Subtotal	21	15	19	16	9	11	10	9
TOTAL REVENUES	39	30	36	31	18	21	19	19
Expenditures								
General Government	9	9	9	10	8	7	7	7
Public Safety	13	12	13	14	12	10	10	10
Public Works	7	6	6	7	7	5	5	5
Health and Welfare	1	1	1	1	1	1	1	1
Recreation and Culture	1	1	1	1	1	1	1	1
TOTAL EXPENDITURES	31	28	30	33	28	23	23	23
Surplus or Deficit	9	1	7	(2)	(10)	(2)	(4)	(5)
Other Operating Funds								
Revenues	3	4	4	3	4	4	3	3
Expenditures	4	4	4	5	4	3	3	3
Surplus or Deficit	(1)	0	0	(1)	0	0	0	0
All Operating Funds								
Revenues	43	34	40	34	22	25	22	21
Expenditures	35	32	33	37	32	27	27	26
Surplus or Deficit	8	1	6	(3)	(10)	(2)	(5)	(5)

Source: Adcock and Associates, Inc., 1982.

Note: Detail may not sum to total or subtotal due to rounding.
Deficits are shown in parentheses.

Table 4-7. PROJECTED EFFECTS OF PROPOSED ACTION ON SAN JUAN COUNTY OPERATING FUNDS: 1985-2000 (thousands of constant 1980 dollars)

	1985	1990	1995	2000
General Fund				
Revenues				
Property Taxes	1	412	1,711	2,433
Charges and Miscellaneous	*	2	2	2
Grants	*	2	3	2
P.I.L.O.T.	1	18	25	18
State Shared	*	9	12	8
Total	2	443	1,753	2,463
Expenditures				
General Government	2	58	80	55
Public Safety	2	36	50	34
Public Works	*	14	19	13
Health and Welfare	*	9	12	8
Recreation and Culture	*	7	10	6
Total	4	124	171	116
Surplus or Deficit	(2)	319	1,582	2,347
Other Operating Funds				
Revenues	2	163	555	745
Expenditures	2	55	77	52
Surplus or Deficit	0	108	478	693
All Operating Funds				
Revenues	4	606	2,308	3,208
Expenditures	6	179	248	168
Surplus or Deficit	(2)	427	2,060	3,040

Source: Adcock and Associates, Inc., 1982

*Rounds to zero.

Note: Deficits are shown in parentheses.

School District Finances

Farmington Municipal School District. The potential fiscal impact of the construction and operation of the proposed action on the Farmington Municipal School District is projected to be positive, resulting in surpluses of up to $8.3 million at 1980-1981 revenue and expenditure rates (Table 4-8). The reason for the magnitude of the potential impact is that project would be located in the Farmington school district and would result in an increased property tax base. As in the case of San Juan County, however, it is expected that at least part of the actual impact of the proposed action would be to lower tax rates. Nonetheless, only about half of the overall tax rate is likely to be affected (the tax rate to cover principal and interest on bonded debt) because reducing the district operational tax rate would make the district ineligible for the State Equalization Guarantee, a revenue source which currently provides about 60 percent of operational revenues. Moreover, the potential surplus is also likely to be reduced somewhat as a result of decreases in the amount of state aid (including the Equalization Guarantee).

Aztec Municipal School District. Given the FY 1981 revenue structure and expenditure patterns, it does not appear that the project-related influx of students into the Aztec school district would trigger sufficient revenues to offset projected expenditures (Table 4-9). Thus, the proposed action would add to the deficits projected for the district without the project. For example, project-related deficits for all funds are estimated at $60,000 in FY 1990, $70,000 in FY 1995, and $50,000 in FY 2000.

Bloomfield Municipal School District. It is estimated that the Bloomfield Municipal School District would exhibit an excess of expenditures over revenues as a result of the construction and

Table 4-8. PROJECTED EFFECTS OF PROPOSED ACTION ON FARMINGTON MUNICIPAL SCHOOL DISTRICT FINANCES: 1989-2000 (thousands of constant 1980 dollars)

	1989-1990	1994-1995	1999-2000
Operational Fund			
Revenues			
Local	730	3,050	4,360
State	460	650	480
Total	1,190	3,700	4,840
Expenditures	540	760	560
Surplus	650	2,940	4,280
Other Operating Funds			
Revenues	710	2,870	4,080
Expenditures	50	60	50
Surplus	660	2,810	4,030
All Funds			
Revenues	1,900	6,570	8,920
Expenditures	590	820	610
Surplus	1,310	5,750	8,310

Source: Adcock and Associates, Inc. 1982.

Table 4-9. PROJECTED EFFECTS OF PROPOSED ACTION ON AZTEC MUNICIPAL SCHOOL DISTRICT FINANCES: 1989-2000 (thousands of constant 1980 dollars)

	1989-1990	1994-1995	1999-2000
Operational Fund			
Revenues			
Local	*	*	*
State	80	100	70
Total	80	100	70
Expenditures	140	170	120
Surplus or Deficit	(60)	(70)	(50)
Other Operating Funds			
Revenues	10	20	10
Expenditures	10	20	10
Surplus or Deficit	0	0	0
All Funds			
Revenues	90	120	80
Expenditures	150	190	130
Surplus or Deficit	(60)	(70)	(50)

Source: Adcock and Associates, Inc. 1982.

*Rounds to zero.

Note: Deficits are shown in parentheses.

operation of the proposed action (see Table 4-10). However, portions of T1, T2, and T3 are located in the district. Construction of a transmission line in one or more of the corridors would result in an increase in the tax base not considered in Table 4-10. At the FY 1981 district operational tax rate of $8.925 per $1,000 of assessed valuation, it would require an increase in assessed valuation in the district of about $11.2 million to eliminate the projected 1994-1995 operational fund deficit. Since the assessed value of the entire transmission line is projected to be less than this amount, the presence of part of the transmission line in the Bloomfield school district would be insufficient to eliminate the entire deficit, though it would help offset it.

Central Consolidated School District

Table 4-11 indicates the projected impact for the Lower Valley portion of the Central Consolidated School District resulting from increased enrollment attributed to the proposed action. As in the Aztec and Bloomfield school districts, the impact on all funds is projected to be negative. For example, project-related deficits are estimated at $50,000 in FY 1990, $80,000 in FY 1995, and $60,000 in FY 2000.

HOUSING

Table 4-12 compares the projected demand for housing in the study area communities both with and without the proposed action (see Appendix C for projection methods). According to those estimates, the construction and operation of the proposed action would result in an accelerated rate in the increased demand for housing (particularly in the last half of the 1980s). In addition, it would create a consistently higher level of total annual housing demand during the study period. For example, between 1986 and 1987, the proposed action is estimated to nearly double the projected increase in housing demand in

Table 4-10. PROJECTED EFFECTS OF PROPOSED ACTION ON BLOOMFIELD MUNICIPAL SCHOOL DISTRICT FINANCES: 1989-2000 (thousands of constant 1980 dollars)

	1989-1990	1994-1995	1999-2000
Operational Fund			
Revenues			
Local	*	*	*
State	60	90	60
Total	60	90	60
Expenditures	130	190	130
Surplus or Deficit	(70)	(100)	(70)
Other Operating Funds			
Revenues	10	20	10
Expenditures	20	20	20
Surplus or Deficit	(10)	0	(10)
All Funds			
Revenues	70	110	70
Expenditures	150	210	150
Surplus or Deficit	(80)	(100)	(80)

Source: Adcock and Associates, Inc. 1982.

*Rounds to zero.

Note: Deficits are shown in parentheses.

Table 4-11. PROJECTED EFFECTS OF PROPOSED ACTION ON CENTRAL CONSOLIDATED SCHOOL DISTRICT (LOWER VALLEY): 1989-2000 (thousands of constant 1980 dollars)

	1989-1990	1994-1995	1999-2000
Operational Fund			
Revenues			
Local	*	*	*
State	20	30	20
Total	20	30	20
Expenditures	60	90	70
Surplus or Deficit	(40)	(60)	(50)
Other Operating Funds			
Revenues	10	10	10
Expenditures	20	30	20
Surplus or Deficit	(10)	(20)	(10)
All Funds			
Revenues	30	40	30
Expenditures	80	120	90
Surplus or Deficit	(50)	(80)	(60)

Source: Adcock and Associates, Inc. 1982.

*Rounds to zero.

Note: Deficits are shown in parentheses.

Table 4-12. PROJECTED HOUSING DEMAND WITH AND WITHOUT PROPOSED ACTION, STUDY AREA COMMUNITIES: 1985-2000

Year	1985	1986	1987	1988	1989	1990	1991	1992
Without Proposed Action								
Farmington	13,770	14,150	14,580	14,960	15,510	16,030	15,740	15,940
Aztec	2,260	2,330	2,370	2,400	2,490	2,580	2,460	2,530
Bloomfield	2,180	2,160	2,250	2,290	2,420	2,400	2,390	2,400
Lower Valley	1,800	1,720	1,760	1,790	1,830	1,860	1,860	1,860
Flora Vista	1,460	1,500	1,530	1,540	1,600	1,640	1,580	1,610
Lee Acres	1,770	1,800	1,840	1,870	1,920	1,970	1,920	1,950
Total	23,240	23,660	24,330	24,850	25,770	26,480	25,950	26,290
With Proposed Action								
Farmington	13,790	14,330	15,150	15,510	15,920	16,600	16,390	16,600
Aztec	2,260	2,350	2,440	2,470	2,540	2,650	2,540	2,620
Bloomfield	2,180	2,180	2,320	2,350	2,470	2,470	2,460	2,490
Lower Valley	1,800	1,740	1,810	1,840	1,880	1,920	1,930	1,940
Flora Vista	1,460	1,510	1,580	1,600	1,630	1,700	1,640	1,680
Lee Acres	1,770	1,820	1,900	1,930	1,970	2,030	1,990	2,040
Total	23,260	23,930	25,200	25,700	26,410	27,370	26,950	27,370

Table 4-12. PROJECTED HOUSING DEMAND WITH AND WITHOUT PROPOSED ACTION, STUDY AREA COMMUNITIES: 1985-2000 (concluded)

Year	1993	1994	1995	1996	1997	1998	1999	2000
Without Proposed Action								
Farmington	15,850	16,050	16,230	16,360	16,580	16,780	16,960	17,160
Aztec	2,470	2,540	2,580	2,600	2,630	2,650	2,650	2,690
Bloomfield	2,440	2,390	2,460	2,480	2,580	2,480	2,560	2,600
Lower Valley	1,860	1,890	1,910	1,940	1,960	1,990	2,000	2,030
Flora Vista	1,600	1,640	1,660	1,680	1,690	1,730	1,740	1,760
Lee Acres	1,950	1,970	2,000	2,040	2,070	2,070	2,100	2,140
Total	26,170	26,480	26,840	27,100	27,510	27,700	28,010	28,380
With Proposed Action								
Farmington	16,550	16,660	16,990	17,050	17,080	17,280	17,450	17,650
Aztec	2,560	2,620	2,680	2,680	2,700	2,710	2,710	2,750
Bloomfield	2,520	2,450	2,550	2,560	2,630	2,540	2,610	2,650
Lower Valley	1,930	1,960	1,990	2,010	2,010	2,040	2,060	2,090
Flora Vista	1,660	1,700	1,730	1,740	1,740	1,780	1,790	1,810
Lee Acres	2,030	2,040	2,090	2,120	2,130	2,130	2,160	2,190
Total	27,250	27,430	28,030	28,160	28,290	28,480	28,780	29,140

the study area. The greatest impact on total housing demand in the study area is projected to occur in 1995, when project-related workers would demand 1,190 housing units, which represents 4.4 percent more than the total number demanded without the project.

The type of housing demanded by project-related workers would change considerably between 1985 and the year 2000 as the proportion of construction and operation workers varies. Because of the shift in work force composition, it is anticipated that, following an initial increase, the demand for mobile homes would decrease from 45 percent of the total project-related demand to 25 percent, while the proportionate demand for single-family homes would increase fairly steadily (see Table 4-13).

As stated in Section 2.0, housing impacts would be considered significant if projected demand exceeds projected supply. The only time period in which there appears to be a potentially significant impact is from 1986 to 1987, when the proposed action would nearly double the demand for housing in the study area, increasing it from a projected 670 units to about 1,270 units. Moreover, as discussed in Section 3.0, it is possible that a shortage of conventional single-family and multifamily units would exist in the study area in the mid-1980s. Thus, the proposed action may exacerbate this shortage. On the other hand, the impact would be moderated somewhat by the relatively large proportion of mobile homes demanded by project-related workers. Since the actual availability of housing for project-related workers in the latter half of the 1980s is so difficult to predict, this should be reassessed at the time of project initation.

MUNICIPAL SERVICES

Water Supply

Table 4-14 presents five-year projections of annual water use with and without the proposed action for the water systems in the

Table 4-13. PROJECTED HOUSING DEMAND BY TYPE OF HOUSING DUE TO PROPOSED ACTION, STUDY AREA: 1985-2000

	Permanent Single Family		Permanent Multifamily		Mobile Home and Other		Total	
Year	Number	Change	Number	Change	Number	Change	Number	Change
1985	20	20	10	10	20	20	50	50
1986	140	120	50	40	130	110	320	270
1987	420	280	140	90	450	320	1,010	690
1988	410	(10)	130	(10)	430	(20)	970	(40)
1989	320	(90)	100	(30)	300	(130)	720	(250)
1990	470	150	140	40	380	80	990	270
1991	550	80	170	30	440	60	1,160	170
1992	610	60	180	10	480	40	1,270	110
1993	590	(20)	170	(10)	430	(50)	1,190	(80)
1994	540	(50)	150	(20)	380	(50)	1,070	(120)
1995	700	160	190	40	460	80	1,350	280
1996	650	(50)	180	(10)	400	(60)	1,230	(120)
1997	520	(130)	130	(50)	260	(140)	910	(320)
1998	530	10	120	(10)	240	(20)	890	(20)
1999	530	0	120	0	220	(20)	870	(20)
2000	530	0	120	0	220	0	870	0

Source: Adcock and Associates, Inc. 1982.

Note: Parentheses indicate a negative change.

Table 4-14. PROJECTED WATER USE WITH AND WITHOUT PROPOSED ACTION, STUDY AREA WATER SYSTEMS: 1985-2000 (acre-feet/year)

	1985			1990			1995			2000		
Location	Without	With	Total	Without	With	Total	Without	With	Total	Without	With	Total
Farmington Municipal Water System												
City of Farmington	14,000	20	14,020	16,400	530	16,930	16,790	750	17,540	17,980	520	18,500
WUAs	2,980	*	2,980	3,010	20	3,030	3,060	30	3,090	3,130	20	3,150
Total	16,980	20	17,000	19,410	550	19,960	19,850	780	20,630	21,110	540	21,650
Aztec Municipal Water System												
City of Aztec	1,260	*	1,260	1,450	40	1,490	1,460	50	1,510	1,570	30	1,600
WUAs	400	*	400	510	10	520	580	20	600	680	20	700
Total	1,660	*	1,660	1,960	50	2,010	2,040	70	2,110	2,250	50	2,300
Bloomfield Municipal Water System												
City of Bloomfield	840	*	840	1,030	30	1,060	1,160	40	1,200	1,330	30	1,360
WUAs	500	*	500	630	20	650	740	30	770	860	20	880
Total	1,340	*	1,340	1,660	50	1,710	1,900	70	1,970	2,190	50	2,240

Source: Adapted from Adcock and Associates, Inc. 1982.

*Less than 5.0 acre-feet/year.

Note: WUA = Water Users Association.

study area. As stated in Section 3.0, the Farmington system needs additional water rights by 1990; the Aztec and Bloomfield systems needed additional water rights in 1980. While the construction and operation of the proposed action would increase the demand on the systems, the increases would be insignificant. For example, the largest increase would occur in the Farmington system in 1995. The increase is estimated at only 4 percent of the total demand.

The construction and operation of the proposed action would require about 35,000 acre-feet of water per year. The purchase of this quantity of water rights (during the same period that the municipal water systems would be seeking to acquire about 5,900 acre-feet of water rights) may raise the price of water rights above the prevailing rate of $1,100 to $1,200 per acre-foot.

Wastewater Systems

Construction and operation of the proposed action would result in Farmington's existing wastewater treatment plant reaching capacity of 11 mgpd in 1988, (one year earlier than it would under projected growth conditions without the project) and 13.02 mgpd in the year 2000 (which is about 0.37 mgpd more than without the project). Both Aztec and Bloomfield have sewage treatment capacities that should be adequate beyond the end of the century, with or without the proposed action. Projected wastewater loads for Aztec and Bloomfield in the year 2000 (1.18 mgpd and 0.97 mgpd, respectively) are only about 0.02 mgpd greater than they would be without the proposed action.

As outlined in Section 3.0, the use of on-site septic tank systems in the rural portion of the study area may be creating adverse health and aesthetic effects. This analysis assumes that project-related increases in the number of housing units using septic tank systems would exacerbate these problems.

Solid Waste Disposal

Expansions needed to accommodate increased demand for solid waste disposal under baseline conditions would be adequate to provide for the needs of the incremental increases expected to result from the proposed action in all affected communities.

PUBLIC EDUCATION

Table 4-15 through Table 4-18 compare projections of school enrollments with and without the proposed action in the potentially affected school districts in the study area. In the Farmington Municipal School District, approximately 260 additional students would be enrolled in 1990-1991 school year, and approximately 320 more would be enrolled by the year 2000, with the proposed action as compared to projected enrollment without the project (see Table 4-15). As indicated in Table 4-19, the project-related students in the Farmington School District would require 13 more teachers by 1990, and 16 more by the year 2000. While the impacts attributable to the proposed action are relatively small compared with projected increases without the project, these increases would aggrevate current and projected shortages of facilities in the Farmington district.

The construction and operation of the proposed action would also increase the number of students and the number of teachers required in the remaining school districts in the study area. For example, in the Aztec Municipal School District, it is estimated that 80 students more would be enrolled in the 1990-1991 school year with the proposed action than without it, and 60 more would be enrolled by the year 2000 (see Table 4-16). In addition, the proposed action would increase teacher requirements by approximately 4 in 1990, and 3 in the year 2000 (Table 4-19). With the proposed action, an estimated 85 more students would attend Bloomfield schools in 1990, and 70 more in 2000,

Table 4-15. FARMINGTON MUNICIPAL SCHOOL DISTRICT, PROJECTED STUDENT POPULATION WITH AND WITHOUT PROPOSED ACTION: 1985-2000

	Kindergarten-Grade 6			Grades 7-9			Grades 10-12			Special Education			Total		
School Year	Without	With	Difference	Without	With	Difference	Without	With	Difference	Without	With	Difference	Without	With	Difference
1980-81*	4,369	N.A.	N.A.	1,755	N.A.	N.A.	1,674	N.A.	N.A.	190	N.A.	N.A.	7,988	N.A.	N.A.
1985-86	5,190	5,245	55	1,945	1,965	20	2.050	2,070	20	225	225	0	9,410	9,505	95
1986-87	5,350	5,520	170	2,005	2,070	65	2,115	2,175	60	230	240	10	9,700	10,005	305
1987-88	5,490	5,660	170	2,060	2,120	60	2,170	2,230	60	240	245	5	9,960	10,255	295
1988-89	5,690	5,815	125	2,135	2,180	45	2,250	2,290	40	245	250	5	10,320	10,535	215
1989-90	5,880	6,060	180	2,205	2,270	65	2,325	2,385	60	255	260	5	10,665	10,975	310
1990-91	5,775	5,980	205	2,165	2,240	75	2,285	2,355	70	250	260	10	10,475	10,735	260
1991-92	5,845	6,075	230	2,195	2,275	80	2,310	2,390	80	255	265	10	10,605	11,005	400
1992-93	5,815	6,025	210	2,180	2,260	80	2,300	2,370	70	250	260	10	10,545	10,915	370
1993-94	5,885	6,085	200	2,210	2,280	70	2,330	2,395	65	255	265	10	10,680	11,025	345
1994-95	5,955	6,200	245	2,235	2,325	90	2,355	2,440	85	255	270	15	10,800	11,235	435
1995-96	6,000	6,230	230	2,250	2,335	85	2,375	2,450	75	260	270	10	10,885	11,285	400
1996-97	6,080	6,255	175	2,280	2,345	65	2,405	2,465	60	265	270	5	11,030	11,335	305
1997-98	6,155	6,330	175	2,310	2,375	65	2,435	2,495	60	265	275	10	11,165	11,475	310
1998-99	6,220	6,395	175	2,335	2,400	65	2,460	2,520	60	270	275	5	11,285	11,590	305
1999-2000	6,295	6,470	175	2,360	2,425	65	2,490	2,560	70	270	280	10	11,415	11,735	320

Source: Adapted from Adcock and Associates, Inc. 1982.

Note: N.A. = not applicable.

*Denotes actual enrollment.

Table 4-16. AZTEC MUNICIPAL SCHOOL DISTRICT, PROJECTED STUDENT POPULATION WITH AND WITHOUT PROPOSED ACTION: 1985-2000

	Kindergarten-Grade 6			Grades 7-9			Grades 10-12			Special Education			Total		
School Year	With-Out	With	Dif-ference	With-out	With NMGS	Dif-ference	With-out	With	Dif-ference	With-out	With	Dif-ference	With-out	With	Dif-ference
1980-81*	1,348	N.A.	N.A.	600	N.A.	N.A.	539	N.A.	N.A.	67	N.A.	N.A.	2,554	N.A.	N.A.
1985-86	1,560	1,575	15	645	650	5	630	635	5	75	75	0	2,910	2,935	25
1986-87	1,590	1,625	35	655	670	15	640	655	15	80	80	0	2,965	3,030	65
1987-88	1,610	1,645	35	665	680	15	650	665	15	80	80	0	3,005	3,070	65
1988-89	1,665	1,695	30	690	700	10	675	685	10	80	85	5	3,110	3,165	55
1989-90	1,720	1,760	40	710	725	15	695	710	15	85	85	0	3,210	3,280	70
1990-91	1,645	1,690	45	680	695	15	665	680	15	80	85	5	3,070	3,150	80
1991-92	1,685	1,735	50	695	715	20	680	700	20	85	85	0	3,145	3,235	90
1992-93	1,660	1,705	45	685	700	15	670	685	15	80	85	5	3,095	3,175	80
1993-94	1,710	1,750	40	705	720	15	690	705	15	85	85	0	3,190	3,260	70
1994-95	1,730	1,780	50	715	735	20	700	715	15	85	90	5	3,230	3,320	90
1995-96	1,745	1,795	50	720	740	20	705	720	15	85	90	5	3,255	3,345	90
1996-97	1,765	1,800	35	730	745	15	715	725	10	85	90	5	3,295	3,360	65
1997-98	1,785	1,825	40	735	750	15	720	735	15	85	90	5	3,325	3,400	75
1998-99	1,795	1,830	35	740	755	15	725	740	15	90	90	0	3,350	3,415	65
1999-2000	1,815	1,850	35	750	765	15	735	745	10	90	90	0	3,390	3,450	60

Source: Adapted from Adcock and Associates, Inc. 1982.

Note: N.A. = not applicable.

*Denotes actual enrollment.

Table 4-17. BLOOMFIELD MUNICIPAL SCHOOLS DISTRICT, PROJECTED STUDENT POPULATION WITH AND WITHOUT PROPOSED ACTION: 1985-2000

	Kindergarten-Grade 6			Grades 7-9			Grades 10-12			Special Education			Total		
School Year	Without	With	Difference	Without	With	Difference	Without	With	Difference	Without	With	Difference	Without	With	Difference
1980-81*	1,549	N.A.	N.A.	704	N.A.	N.A.	590	N.A.	N.A.	103	N.A.	N.A.	2,946	N.A.	N.A.
1985-86	1,745	1,760	15	725	730	5	710	715	5	115	115	0	3,295	3,320	25
1986-87	1,810	1,840	30	750	760	10	735	750	15	120	120	0	3,415	3,470	55
1987-88	1,835	1,870	35	760	775	15	745	760	15	120	125	5	3,460	3,530	70
1988-89	1,910	1,935	25	795	800	5	780	790	10	125	130	5	3,610	3,655	45
1989-90	1,930	1,965	35	800	815	15	785	800	15	125	130	5	3,640	3,710	70
1990-91	1,895	1,940	45	785	805	20	775	790	15	125	130	5	3,580	3,665	85
1991-92	1,920	1,970	50	795	815	20	785	800	15	125	130	5	3,625	3,715	90
1992-93	1,935	1,975	40	805	815	10	790	800	10	125	130	5	3,655	3,720	65
1993-94	1,920	1,965	45	795	815	20	785	800	15	125	130	5	3,625	3,710	85
1994-95	1,965	2,020	55	815	835	20	800	820	20	130	135	5	3,710	3,810	100
1995-96	1,990	2,050	60	825	845	20	810	830	20	130	135	5	3,755	3,860	105
1996-97	2,045	2,085	40	850	865	15	835	845	10	135	135	0	3,865	3,930	65
1997-98	2,005	2,045	40	830	845	15	820	830	10	130	135	5	3,785	3,855	70
1998-99	2,050	2,090	40	850	865	15	835	850	15	135	140	5	3,870	3,945	75
1999-2000	2,085	2,120	35	865	880	15	850	865	15	135	140	5	3,935	4,005	70

Source: Adapted from Adcock and Associates, Inc. 1982.

N.A. = not applicable.

*Denotes actual enrollment.

Table 4-18. CENTRAL CONSOLIDATED SCHOOL DISTRICT (LOWER VALLEY), PROJECTED STUDENT POPULATION WITH AND WITHOUT PROPOSED ACTION: 1985-2000

	Kindergarten-Grade 6			Grades 7-9			Grades 10-12			Special Education			Total		
School Year	Without	With	Difference	Without	With	Difference	Without	With	Difference	Without	With	Difference	Without	With	Difference
1980-81*	1,352	N.A.	N.A.	536	N.A.	N.A.	439	N.A.	N.A.	155	N.A.	N.A.	2,482	N.A.	N.A.
1985-86	1,460	1,465	5	600	605	5	545	545	0	170	170	0	2,775	2,785	10
1986-87	1,475	1,490	15	610	615	5	550	560	10	170	175	5	2,805	2,840	35
1987-88	1,485	1,505	20	615	620	5	555	565	10	175	175	0	2,830	2,865	35
1988-89	1,510	1,525	15	625	630	5	565	570	5	175	175	0	2,875	2,900	25
1989-90	1,525	1,540	15	630	635	5	570	580	10	175	180	5	2,900	2,935	35
1990-91	1,525	1,545	20	630	635	5	570	580	10	175	180	5	2,900	2,940	40
1991-92	1,525	1,550	25	630	640	10	570	585	15	175	180	5	2,900	2,955	55
1992-93	1,525	1,545	20	630	635	5	570	580	10	175	180	5	2,900	2,940	40
1993-94	1,540	1,560	20	635	645	10	575	585	10	180	180	0	2,930	2,970	40
1994-95	1,545	1,570	25	640	650	10	580	590	10	180	185	5	2,945	2,995	50
1995-96	1,560	1,585	25	645	655	10	585	595	10	180	185	5	2,970	3,020	50
1996-97	1,565	1,585	20	645	655	10	590	595	5	180	185	5	2,980	3,020	40
1997-98	1,580	1,600	20	655	660	5	595	600	5	185	185	0	3,015	3,045	30
1998-99	1,585	1,605	20	655	665	10	600	605	5	185	185	0	3,025	3,060	35
1999-2000	1,600	1,620	20	660	670	10	605	610	5	185	190	5	3,050	3,090	40

Source: Adapted from Adcock and Associates, Inc. 1982.

N.A. = not applicable.

*Denotes actual enrollment.

Table 4-19. PROJECTED TEACHER REQUIREMENTS WITH AND WITHOUT PROPOSED ACTION, STUDY AREA SCHOOL DISTRICTS: 1985-2000

		1985-1986			1990-1991			1995-1996			1999-2000		
School District/ Grade Level	1980[a]	Without	With	Difference	Without	With	Difference	Without	With	Difference	Without	With	Difference
Farmington Municipal Schools													
K-6	212	252	255	3	280	290	10	291	303	12	306	314	8
7-12	170	198	200	2	221	223	2	229	238	9	240	247	7
Total[b]	395	465	470	5	518	531	13	538	558	20	564	580	16
Aztec Municipal Schools													
K-6	65	76	76	0	79	82	3	84	87	3	88	90	2
7-12	60	67	67	0	70	72	2	74	76	2	78	79	1
Total[b]	131	150	150	0	158	162	4	167	172	5	174	177	3
Bloomfield Municipal Schools													
K-6	70	79	79	0	85	87	2	90	92	2	94	95	1
7-12	70	78	79	1	85	87	2	89	91	2	94	95	1
Total[b]	144	162	162	0	175	179	4	184	189	5	193	196	3
Central Consolidated Schools (Lower Valley)													
K-6	62	66	66	0	69	70	1	71	72	1	73	74	1
7-12	41	48	48	0	50	51	1	52	53	1	53	54	1
Total[b]	113	126	126	0	132	134	2	135	137	2	138	140	2

Source: Adapted from Adcock and Associates, Inc. 1982.

[a] Denotes actual enrollment.

[b] Total includes special education teachers.

than if the project were not constructed. In addition, approximately 4 more teachers would be required in 1990, and 3 more in 2000, than under baseline projected growth. The Lower Valley portion of the Central Consolidated School District would have an estimated 40 additional students enrolled in 1990 and the year 2000 with the proposed action. These students would require approximately 2 additional teachers. In general, impacts on facilities in the Aztec, Bloomfield, and Central Consolidated (Lower Valley portion) school districts resulting from the proposed action would be relatively minor. Expansions in staff and facilities made in those districts to accommodate anticipated growth without the proposed action should be adequate to meet project-related needs as well.

HEALTH SERVICES

As indicated by the figures in Table 4-20, incremental needs for health care facilities and staff associated with the proposed action are very minor compared to projected needs without the project. San Juan County's Medical Center could expand to accommodate projected cumulative needs beyond the turn of the century. The proposed action would create a need for two additional primary care physicians and two more dentists by 1990; and two physicians and one more dentist by the year 2000, if current service levels are to be maintained.

HUMAN SERVICES

It is extremely difficult to quantify projected supply and demand for human services, with or without the proposed action. Two factors, however, should be considered: 1) that most human service providers in the study area were operating at or near capacity in 1981 and 2) that funding for future continuation or expansion of services is uncertain. On one hand, the large construction work force associated

Table 4-20. PROJECTED HEALTH CARE REQUIREMENTS WITH AND WITHOUT PROPOSED ACTION, STUDY AREA: 1985-2000

Agency	1985	1990	1995	2000
Hospital Beds[a]				
Without	106	120	122	129
With	106	124	127	132
Difference	0	+4	+5	+3
Hospital Beds[b]				
Without	122	138	140	148
With	122	143	146	152
Difference	0	+5	+6	+4
Primary Care Physicians[c]				
Without	67	76	77	81
With	67	78	80	83
Difference	0	+2	+3	+2
Ambulance/Rescue Vehicles				
Without	10	11	11	12
With	10	11	12	12
Difference	0	0	+1	0
Dentists				
Without	40	45	46	49
With	40	47	48	50
Difference	0	+2	+2	+1

Source: Adapted from Adcock and Associates, Inc. 1982.

[a] Occupied beds.

[b] Occupied beds plus 15 percent vacancy rate.

[c] Nonfederal physicians.

Note: N/A = not applicable.

with the project could create increased demand for services such as alcohol and drug abuse counseling, child protection, and family counseling. On the other hand, increased employment opportunities and personal income resulting from the project could be associated with a decrease in demand for human services. It would be useful to assess demand for human services in those years when the project-related population impacts are greatest, and to prepare to mitigate impacts to human services delivery when and if necessary. Nonetheless, this analysis assumes that construction and operation of the proposed action would serve to exacerbate the potentially significant shortfalls of human services that would exist in the study area under Baseline 1.

LAW ENFORCEMENT

Table 4-21 compares projected law enforcement manpower requirements to maintain current service levels in the study area with and without the proposed action. Projections of personnel requirements with the project are the same as, or one officer more than, baseline projections for all agencies except the Farmington Police Department. The Farmington Police Department would require 3 additional officers in 1990, 5 in 1995, and 3 in 2000 beyond projected requirements without the proposed action. It is assumed, however, that project-related demand would not represent a sigificant impact to the study area's law enforcement agencies.

FIRE PROTECTION

Incremental projected need for firefighters, response vehicles, and fire stations in the study area as a result of the proposed action are summarized in Table 4-22. Differences between these projections and projected need without the project are summarized below for 1990 and 2000:

Table 4-21. PROJECTED LAW ENFORCEMENT AGENCY POLICE OFFICER REQUIREMENTS WITH AND WITHOUT PROPOSED ACTION, STUDY AREA: 1985-2000

Agency	1981[a]	1985	1990	1995	2000
New Mexico State Police[b]					
Without	19	21	24	24	26
With	N/A	21	25	25	26
Difference		0	+1	+1	0
San Juan County Sheriff Office					
Without	27	29	31	32	34
With	N/A	29	32	33	34
Difference		0	+1	+1	0
Farmington Police Department					
Without	81[c]	98	115	116	123
With	N/A	99	118	121	126
Difference		+1	+3	+5	+3
Aztec Police Department					
Without	14	16	18	18	18
With	N/A	16	18	18	19
Difference		0	0	0	+1
Bloomfield Police Department					
Without	12	14	15	15	16
With	N/A	14	15	16	16
Difference		0	0	+1	0

Source: Adapted from Adcock and Associates, Inc., 1982.

[a] Denotes authorized staff level.

[b] San Juan County area only.

[c] 1980 data.

Note: N/A = not applicable.

Table 4-22. PROJECTED FIRE DEPARTMENT NEEDS WITH AND WITHOUT PROPOSED ACTION, STUDY AREA: 1985-2000

Agency	1981[a]	1985	1990	1995	2000
Farmington Fire Department					
Firefighters[b]					
Without	79	90	105	107	113
With	N/A	91	109	111	116
Difference		+1	+4	+4	+3
Response Vehicles					
Without	15	17	20	20	21
With	N/A	17	21	21	22
Difference		0	+1	+1	+1
Fire Stations					
Without	5	6	7	7	7
With	N/A	6	7	7	7
Difference		0	0	0	0
Aztec Fire Department					
Firefighters[b]					
Without	35	39	44	44	46
With	N/A	39	46	46	47
Difference		0	+2	+2	+1
Response Vehicles					
Without	5	6	6	6	6
With	N/A	6	6	6	7
Difference		0	0	0	+1
Fire Stations					
Without	2	2	2	2	3
With	N/A	2	2	2	3
Difference		0	+0	+0	0
Bloomfield Fire Department					
Firefighters[b]					
Without	33	36	40	41	43
With	N/A	36	41	42	44
Difference		0	+1	+1	+1
Response Vehicles					
Without	7	8	9	9	9
With	N/A	8	9	9	10
Difference		+0	0	0	+1

Table 4-22. PROJECTED FIRE DEPARTMENT NEEDS WITH AND WITHOUT PROPOSED ACTION, STUDY AREA: 1985-2000 (concluded)

Agency	1981[a]	1985	1990	1995	2000
Fire Stations					
Without	1	1	1	1	1
With	N/A	1	1	1	1
Difference		0	0	0	0
San Juan County Fire Department					
Firefighters[b]					
Without	230	246	265	271	287
With	N/A	246	271	280	293
Difference		0	+6	+9	+6
Response Vehicles					
Without	29	31	33	34	36
With	N/A	31	34	35	37
Difference		0	+1	+1	+1
Fire Stations					
Without	11	12	13	13	14
With	N/A	12	13	13	14
Difference		0	0	0	0

Source: Adapted from Adcock and Associates, Inc. 1982.

[a] Actual number.

[b] Entries are number of volunteer firefighters.

Note: N/A = not applicable.

Farmington:	4 more firefighters and 1 more response vehicle in 1990; 3 more firefighters and 1 more response vehicle in the year 2000.
Aztec:	2 more firefighters in 1990; 1 more firefighter and 1 additional response vehicle in the year 2000.
Bloomfield:	1 more firefighter in 1990; 1 more firefighter and 1 more response vehicle in the year 2000.
San Juan County:	6 more firefighters and 1 more response vehicle in 1990 and again in the year 2000.

This analysis assumes that project-related demand would not represent a significant impact to the study area's fire protection agencies.

TRANSPORTATION

Refer to the Transportation Technical Report for a discussion of the project-related impacts on regional and community transporation networks.

COMMUNITY RECREATION

Projections of demand for recreation facilities are based on per capita demand estimates developed in New Mexico's State Comprehensive Outdoor Recreation Plan (SCORP) for San Juan and McKinley counties. With the proposed action, Farmington's shortage of developed park land would increase by an estimated 6 acres, or an additional 10 percent, in the last decade of the century. Tennis, swimming, picnic, golf and racquetball facilities would be needed in Farmington by 1990, with or without the project.

Aztec's park, tennis, and swimming facilities will be adequate beyond the year 2000, with or without the project. Although Bloomfield's tennis and swimming facilities are adequate through the turn of the century, the projected shortfall of developed park land would be increased by about 0.75 acre (or 5 percent) in 1990 and 2000 with the project. Projections indicate a need for additional picnic, golf, and raquetball facilities in both communities by 1990, with or without the proposed action. Differences in combined projected demand for community recreation facilities in northern San Juan County with and without the project (based on population projections) are summarized in Table 4-23.

Project-related demand would not represent a significant impact to the study area's recreation facilities.

TRANSMISSION LINE CONSTRUCTION

The construction of an extra-high-voltage transmission line involves a series of sequential tasks or stages performed by specialized crews within designated rights-of-way. Major tasks include rights-of-way clearing, access road construction, foundation installation, tower assembly and erection, conductor and shield wire installation, and site restoration.

The potential socioeconomic impacts related to the construction of the 500-kV transmission line system would occur at three different points in time: the construction of the 500-kV loop would coincide with the construction of Unit 1; the construction of the first 500-kV

Table 4-23. PROJECTED COMMUNITY RECREATION FACILITY SUPPLY AND DEMAND WITH AND WITHOUT PROPOSED ACTION: 1985-2000

Year	Park Land[a]			Tennis Courts			Swimming Facilities[b]			Picnic Tables			Golf Course Holes			Racquetball Courts		
	Supply	Demand	Need	Supply	Demand	Need	Supply	Demand	Need	Supply	Demand	Need	Supply	Demand	Need	Supply	Demand	Need
1981	178	157	0	22	16	0	20,250	22,850	2,600	146	152	6	18	20	2	5	3	0
1985																		
Without	178	188	10	22	18	0	20,250	25,550	5,300	146	170	24	18	23	5	5	3	0
With	178	188	10	22	18	0	20,250	25,600	5,350	146	170	24	18	23	5	5	3	0
1990																		
Without	178	217	39	22	20	0	20,250	28,900	8,650	146	192	46	18	26	8	5	3	0
With	178	224	46	22	21	0	20,250	29,700	9,450	146	198	52	18	27	9	5	4	0
1995																		
Without	178	220	42	22	21	0	20,250	29,350	9,100	146	195	49	18	26	8	5	4	0
With	178	229	51	22	22	0	20,250	30,450	10,200	146	203	57	18	27	9	5	4	0
2000																		
Without	178	232	54	22	22	0	20,250	30,950	10,700	146	206	60	18	28	10	5	4	0
With	178	238	60	22	22	0	20,250	31,750	11,500	146	211	65	18	28	10	5	4	0

Source: Adcock and Associates, Inc., 1982.

[a] Entries are acres of developed Neighborhood Parks, Athletic Fields, and District Parks for Farmington, Aztec, and Bloomfield only.

[b] Entries are square feet of swimming pool surface area and include facilities operated by municipal school districts that are available for public use.

transmission line and associated substations would coincide with Unit 2; and the construction of the second transmission line would coincide with Unit 4.

PNM estimates that construction of the 5-mile 500-kV loop would occur during a 4-month period and would require a peak work force of approximately 35 persons. It was further estimated that the first and second 500-kV transmission lines would be constructed in 12 and 13 months, respectively. Peak employment for the first line is estimated at 145 persons with 25 additional people required for substation construction. Peak employment for the second 500-kV transmission line is projected to be approximately 150 persons. The total estimated cost of the transmission line project is $256,618,458.

Operation and maintenance activities for the 500-kV transmission line system would be minimal. The rights-of-way would be patrolled by helicopter on a monthly basis. Maintenance activities would be performed as necessary by PNM staff. Substation operation would be monitored by generating station staff; thus, additional operation personnel would not be required. (See the Project Description Technical Report for more detailed information.)

Because the construction and operation of the proposed 500-kV transmission line system would occur in conjunction with the construction and operation of the more labor-intensive generating station, the analysis of potential socioeconomic effects (e.g., demographic, economic, housing, public services and facilities, and fiscal changes) resulting from the 500-kV transmission line system in San Juan and McKinley counties were included in the overall project analysis as detailed in Sections 3.0 and 4.0. The following section discusses the potential socioeconomic effects related to the transmission line system located outside the two-county study region. As shown on Map

1-2, approximately one-third of T1, T2, and T3 is within Sandoval County (the location of the Rio Puerco Station). In addition, a small segment of T4 crosses the northeastern corner of Cibola County and the southwestern portion of Sandoval County.

The principal project-related socioeconomic effects outside San Juan and McKinley counties would include: (1) jobs for local residents (e.g., workers whose place of residence would not change in order for them to work on the project); (2) expenditures made by non-local construction workers in-migrating to the project area on a temporary basis; (3) utility and contractor purchases of equipment and materials; and (4) potential property tax revenues. (The potential property tax revenues associated with each transmission line alternative are discussed in Section 9.0.)

Due to the small size, transitory nature, and changing demand of the transmission line work force requirements on one hand, and the small size of the local economies and the limited availability of residency alternatives for relocating workers outside the Albuquerque area on the other hand, the total project-related socioeconomic effects to Sandoval, Cibola, and Bernalillo counties would be negligible in terms of each county's total economic and demographic characteristics. For example, even if the entire transmission line work force were allocated to either Cibola, Sandoval, or Bernalillo counties, the new jobs would represent less than 1 percent of each county's total work force. Moreover, because the work force requirements are small and because the jobs are temporary (lasting less than one year), there would be few, if any, indirect employment opportunities (PNM 1980). Nonetheless, any new project-related jobs for local residents and any construction worker, utility, or contractor expenditures for equipment, materials, or services would represent beneficial project-related effects.

Potential tax revenues would be the most important project-related impact. Since communities and taxing jurisdictions within Cibola and Sandoval counties would not be required to increase expenditures for services and facilities to meet project-related worker demands, potential increased property tax revenues (or potential reductions in tax rates) would be considered a positive, long-term effect. (See Table 9-2 in Section 9.0 for an example of potential revenues.)

WATER PIPELINE CONSTRUCTION

The construction and operation of the water supply system for the proposed action would result in changes in the socioeconomic environment. Because of the location of the three alternative routes in San Juan County and because of the proximity of the routes to Farmington, Aztec, and Bloomfield, most of the impacts would occur within San Juan County. The principal project-related factors creating changes in the socioeconomic environment include: (1) jobs for local residents (during the construction of the first pipeline as well as the second pipeline); (2) the in-migration of nonlocal workers (e.g., workers whose place of residency would change in order for them to work on the project); (3) utility and contractor purchases of equipment and materials; and (4) nonlocal worker expenditures for goods and services (especially gasoline, food, and lodging). The nature and magnitude of the impacts would be a function of the characteristics and availability of the local labor force, adjustments in the housing sector, the number and characteristics of in-migrating workers, the amount of local purchases, and the excess capacities of community infrastructures.

The construction of the water supply system is only one component of the overall project that would occur in San Juan County during the study period. Thus, the analysis of the supply and demand of local workers, the in-migration of additional workers and their families, and subsequent changes in the demographic, economic, housing, and community infrastructures resulting from the construction and operation of the water supply system are addressed as part of the plant site analysis in sections 3.0 and 4.0.

WELL-FIELD USE

Some present users of water wells in the affected region could incur additional costs if drawdown resulted from implementation of the well-field alternative (see the Hydrology Technical Report for more information).

5.0
SUGGESTED MITIGATION

Few of the potential social and economic impacts identified in this analysis could be called significant, according to the criteria defined in the Framework for Analysis. Potential impacts in two areas, housing and human services, are too uncertain to label as either significant or nonsignificant at this time. Consistent with the "worst-case" approach, impacts to these two aspects of the future social and economic environment are considered significant in the absence of knowledge that would indicate otherwise. As was indicated in the housing section, there is an abundance of land zoned for residential use in the affected communities. However, current vacancy rates are low, much of the existing housing stock is in fair to poor condition, and construction activity is slow due to high mortgage interest rates. Human services agencies in northern San Juan County are currently operating at or near capacity, and their prospect for future funding is uncertain. These aspects of the social and economic environment should be reassessed 12 months prior to project start-up, and appropriate mitigation measures should be determined at that time. If, for example, sufficient housing is not available in the Farmington area at the time of NMGS unit construction, PNM should consider such options as: a construction work camp, mass transportation from other communities, or various employee housing subsidies or incentives.

If significant shortages of human services are identified, additional services (such as counseling or day-care) could be provided by the applicant for the project-related population. It is recommended that social and economic impact assessment be continued through a 10-year monitoring program to identify critical needs for additional mitigation measures. Mitigation of potential impacts to traditional Navajo values and lifestyles is included in Appendix D.

6.0

UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts on community infrastructures and services would result from construction and operation of NMGS. This report does identify, however, some types of impacts or changes which NMGS would cause in the affected environment, and which would be perceived by some elements of the local population as adverse. For example, while the project would bring benefits to some people through increased employment opportunities and personal income, it would add to local inflationary pressures, which could cause hardships to senior citizens and other people on fixed incomes. In addition, some local workers are likely to leave their current employment (e.g., teaching, police work, retail sales, etc.) to accept higher-paying NMGS construction or operation jobs. This would benefit the workers, but not their current employers, who could find it more and more difficult to compete with energy project wages.

The proposed action would result in some influx of new workers to northern San Juan County. This would cause a shift in population composition in the study area as the proportions of non-Natives (primarily "Anglos") increase. This could result in a loss of political strength among the Native American population, as well as the potential for increases in various kinds of discrimination if newcomers do not understand or appreciate the Native American cultures. Those who are currently unemployed or underemployed in the region could experience an increased sense of relative deprivation if outsiders are the ones who reap most of the benefits of growth and development.

The analysis of potential impacts to traditional lifestyles and values (contained in Appendix D) indicates that further unavoidable adverse impacts could be experienced by some Navajos living in and around the proposed plant site. Some additional costs may be incurred by present water-well users if drawdown results from implementation of the well-field alternative (see the Hydrology Technical Report for more detail).

7.0

RELATIONSHIPS BETWEEN THE SHORT-TERM USE OF THE AFFECTED ENVIRONMENT AND THE LONG-TERM PRODUCTIVITY

No relationships between the short-term use of the affected environment and long-term productivity were identified for social and economic conditions.

8.0

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

No irreversible and irretrievable commitments of social and economic resources were identified.

9.0

COMPARISON OF ALTERNATIVES

The purpose of this section is to outline potential differences in the socioeconomic impacts among the alternatives for the water supply system (P1, P2, and P3) and the alternatives for the 500-kV transmission line system (T1, T2, T3, and T4). The individual topics or issues that are addressed include potential socioeconomic effects related to construction workers, property taxes, rights-of-way payments, mineral resources, and Navajo grazing permits. Each section includes a discussion of potential differences between transmission line alternatives as well as water pipeline alternatives.

WORK FORCE IMPACTS

An examination of the potential economic and population impacts resulting from the construction and operation of the proposed transmission line system within each of the four alternative routes indicates that in general the impacts would be similar for each alternative. The major difference occurs in a comparison of T4 to T1, T2, or T3. Because of its southerly location, access to T4 would follow Interstate 40 rather than New Mexico Highway 44. Thus, the housing and related services and facilities demands of relocating workers associated with T4 would occur in different communities. However, these differences were considered to be too small to warrant quantification.

Because of the location of all three water supply system routes in San Juan County, because of the proximity of the routes to each other and to the major population center in San Juan County (Farmington/Bloomfield/Aztec), and because of similar work force requirements, there have been no important differences identified between the potential economic and population impacts for P1, P2, or P3.

PROPERTY TAXES

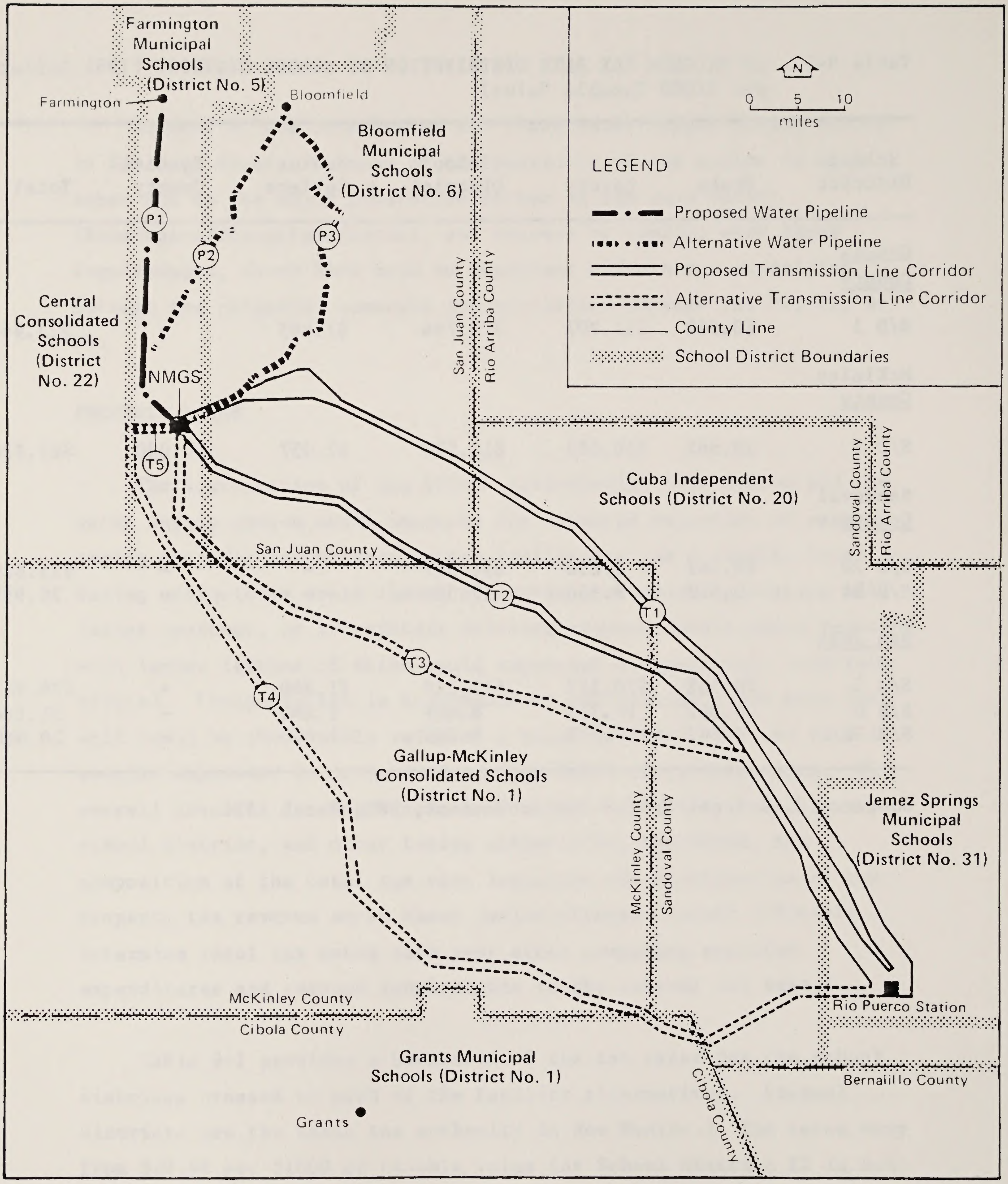
The construction of the 500-kV transmission line system and the water supply system would increase the assessed valuation of each taxing jurisdiction crossed by the facilities. As a result, local taxing authorities could choose to increase revenues by keeping mill levies constant, or to maintain existing revenue levels while reducing mill levies (either of which would represent a beneficial, long-term effect). (Property tax is determined by multiplying a tax rate [or mill levy] by the taxable value of a piece of land. The tax rate is usually expressed in dollars of tax per $1000 of taxable value. The overall tax rate is a combination of rates set by the state, county school district, and other taxing authorities; therefore, the composition of the total tax rate indicates the distribution of the property tax revenue among these jurisdictions. County officials determine local tax rates each year after comparing expected expenditures and revenue requirements to the current tax base.)

Table 9-1 provides a breakdown of the tax rates for the school districts crossed by each of the facility alternatives. (School districts are the basic tax authority in New Mexico.) The rates vary from $20.96 per $1000 of taxable value for School District 22 in San Juan County to $27.00 in School District 31 in Sandoval County. (Map 9-1 shows the location of project components within each identified school district.)

Table 9-1. AD VALOREM TAX RATE DISTRIBUTION BY SCHOOL DISTRICT (1981 Dollars per $1000 Taxable Value)

School District	State	County	School District	Junior College	Special County	Total
Cibola County						
S/D 1	$0.562	$11.707	$ 9.794	$1.885	-	$23.948
McKinley County						
S/D 1	$0.562	$10.023	$11.578	$2.057	$1.000	$25.220
Sandoval County						
S/D 20	$0.562	$ 8.850	$16.517	-	-	$25.929
S/D 31	0.562	8.850	17.583	-	-	26.995
San Juan						
S/D 5	$0.562	$10.313	$12.248	$1.840	-	$24.963
S/D 6	0.562	10.313	8.469	1.840	-	21.184
S/D 22	0.562	10.313	8.245	1.840	-	20.960

Source: G. Griego, Senior Tax Accountant, PNM, March 1982.


Farmington Municipal Schools (District No. 5)
Farmington
Bloomfield
Bloomfield Municipal Schools (District No. 6)
N
0 5 10
miles
LEGEND
Proposed Water Pipeline
Alternative Water Pipeline
Proposed Transmission Line Corridor
Alternative Transmission Line Corridor
County Line
School District Boundaries
P1
P2
P3
Central Consolidated Schools (District No. 22)
NMGS
San Juan County
Rio Arriba County
T5
Cuba Independent Schools (District No. 20)
Sandoval County
Rio Arriba County
San Juan County
T2
T1
T3
T4
Gallup-McKinley Consolidated Schools (District No. 1)
McKinley County
Sandoval County
Jemez Springs Municipal Schools (District No. 31)
Rio Puerco Station
McKinley County
Cibola County
Grants Municipal Schools (District No. 1)
Cibola County
Bernalillo County
Grants

Source: Public Service Company of New Mexico, 1982

Map 9-1. SCHOOL DISTRICTS WITHIN PROJECT AREA

Table 9-2 provides an example of the potential property tax revenues that could accrue to each alternative transmission line route during the first year following completion of the facility. Table 9-3 outlines the same information for each water supply system alternative. These estimates assume that taxing authorities would choose to increase revenues rather than reduce tax rates. Moreover, the tables identify which school districts would be crossed by the transmission line and pipeline alternatives and establish the length of each alternative within each district. As shown in the table, differences in potential revenues are a function of the total length of the alternatives and the tax rates of the school districts crossed.

RIGHT-OF-WAY PAYMENTS

Prior to construction of the proposed transmission line and water supply systems, the final rights-of-way would be negotiated by PNM with the appropriate landowners. While the proposed rights-of-way would not cross any Native American reservations, they would transect land within the Eastern Navajo Agency that is under Navajo Indian ownership or administrative jurisdiction. This includes tribal trust, tribal fee, private Indian allotments, and Indian withdrawal lands. Therefore, the Navajo Tribe would receive rights-of-way payments for the proposed facilities. These payments would represent a beneficial effect of the project to the Navajo Tribe as a whole.

Because of the checkerboard nature of the land ownership patterns in the project area, the total amount of Navajo land crossed by a particular transmission line or pipeline rights-of-way could vary considerably with the actual identification of the centerline within a particular corridor. Table 9-4 provides an estimate of the amount of Navajo land potentially affected by each transmission line and pipeline alternative.

Table 9-2. ESTIMATED TAX REVENUES FOR TRANSMISSION LINE SYSTEM ALTERNATIVES (Year Following Project Completion)

Alternative	County	School District	Miles[a]	Total Cost[b] (000's)	Taxable Value[c] (000's)	Tax Rate Per $1000[d]	Year 1 Tax Amount
T1	McKinley	1	6.5	$ 4,920	$ 1,640	$25.220	$ 41,361
	San Juan	5	3.0	2,271	757	24.963	18,897
	San Juan	6	30.50	23,089	7,696	21.184	163,032
	Sandoval	20	73.0	55,261	18,420	25.929	477,612
T1	Total		113.00	$85,541	$28,513		$700,902
T2	McKinley	1	24.5	$18,546.5	$ 6,182	$25.220	$155,910
	San Juan	5	5.25	3,974.25	1,325	24.963	33,076
	San Juan	6	27.0	20,439	6,813	21.184	144,327
	Sandoval	20	29.25	22,142.25	7,381	25.929	191,382
	Sandoval	31	18.0	13,626	4,542	26.995	122,611
T2	Total		104.00	$78,728.00	$26,243		$647,306
T3	McKinley	1	51.75	$39,174.75	$13,058	$25.220	$329,323
	San Juan	5	14.0	10,598	3,533	24.963	88,194
	Sandoval	20	25.5	19,303.5	6,435	25.929	166,853
	Sandoval	31	18.75	14,193.75	4,732	26.995	127,740
T3	Total		110.00	$83,270	$27,758		$712,110
T4	McKinley	1	84.0	$ 63,588	$21,196	$25.220	$534,563
	Cibola	1	6.25	4,731.25	1,577	23.948	37,766
	San Juan	5	15.0	11,355	3,785	24.963	94,485
	San Juan	22	6.0	4,542	1,514	20.960	31,733
	Sandoval	20	15.25	11,544.25	3,848	25.929	99,775
	Sandoval	31	7.5	5,677.5	1,892	26.995	51,075
T4	Total		134.00	$101,438	$33,812		$849,397

Source: G. Griego, Senior Tax Accountant, PNM, March 1982.

[a] The total number of miles for each alternative was based on 1981 corridor estimates made by PNM. The total length of the transmission lines will depend on the actual location of the centerline within a particular corridor.

[b] Total cost was calculated in 1993 dollars and was based on a $757,000 value per mile.

[c] Taxable value for transmission line facilities is equal to one-third of the total cost/property value.

[d] Tax rates used were those for 1981.

Table 9-3. ESTIMATED TAX REVENUES FOR WATER SUPPLY SYSTEM ALTERNATIVES (Year Following Project Completion)

Alternative	County	School District	Miles	Total Cost[a] (000's)	Taxable Value[b] (000's)	Tax Rate Per $1000[c]	Year 1 Tax Amount
P1	San Juan	5	39.75	$60,400	$20,133	24.963	$502,580
P1	Total		39.75	$60,400	$20,133		$502,580
P2	San Juan	5	25.75	$35,900	$11,966	24.963	$298,707
	San Juan	6	17.00	23,700	7,900	21.184	167,354
P2	Total		42.75	$59,600	$19,866		$466,061
P3	San Juan	5	4.25	$ 5,800	$ 1,933	24.963	$ 48,253
	San Juan	6	44.25	60,600	20,200	21.184	427,917
P3	Total		48.50	$66,400	$22,133		$476,170

Source: G. Griego, Senior Tax Accountant, PNM, March 1982.

[a] Total cost was estimated in 1980 dollars.

[b] Taxable value for water supply system facilities is equal to one-third of the total cost/property value.

[c] Tax rates used were those for 1981.

Table 9-4. INDIAN LANDS LOCATED WITHIN ALTERNATIVE TRANSMISSION LINE CORRIDORS AND CROSSED BY PROPOSED WATER PIPELINE ROUTES

Alternative	Indian	Indian Withdrawal	Total
T1	19.35	-	19.35
T2	38.55	3.20	41.75
T3	37.90	12.70	50.60
T4	39.80	-	39.80
P1	29.20	-	29.20
P2	24.80	-	24.80
P3	3.00	-	3.00

Source: Woodward-Clyde Consultants, 1982.

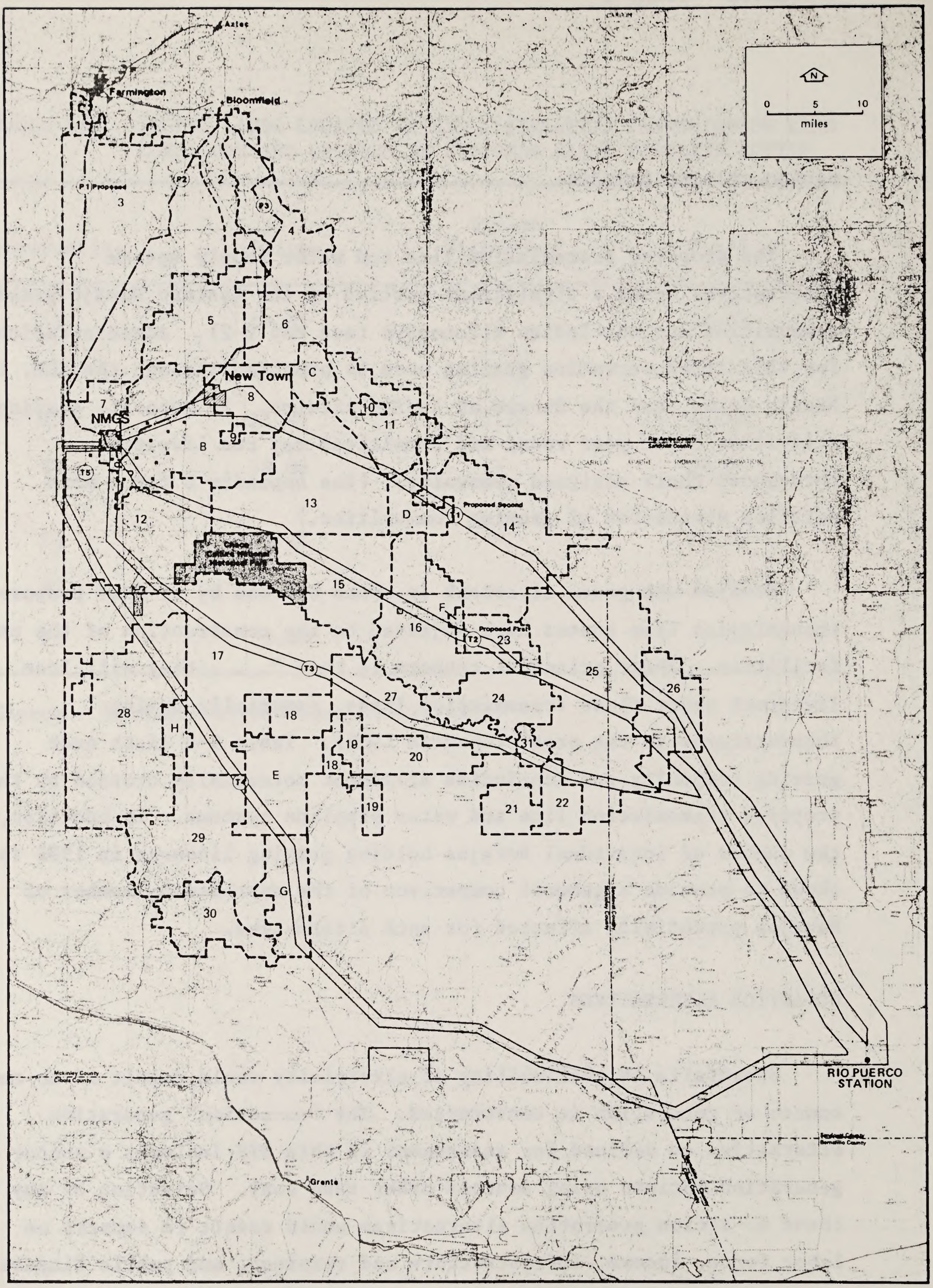
NAVAJO GRAZING PERMITS

The proposed transmission line and water supply system alternatives cross a significant portion of the Eastern Navajo grazing communities and non-Indian allotments (see Map 9-2). Administration for this off-Reservation grazing area is provided through the BLM, the Navajo Tribe, and the Bureau of Indian Affairs. In general, grazing activities occur year round and permittees may run livestock throughout their assigned community. (See Appendix D for a more detailed discussion of grazing communities.)

Navajos who graze livestock in areas crossed by or near proposed transmission line routes have objected to the construction of the new facilities. Their principal concern is that ". . . they will lose livestock under these transmission lines, especially during thunderstorms in the area" (Charlie 1982). Table 9-5 lists each grazing community and non-Indian allotment potentially crossed by the proposed transmission line and water pipeline systems. In addition, the number of individual Navajos holding grazing licenses in 1982 is shown to provide a general comparison of the approximate number of Navajos potentially affected for each alternative.

NO-ACTION ALTERNATIVES

Shortfalls in availability of electricity could result if no new source of generation is constructed. The "no-action" generation alternative as defined for assessment in this EIS includes a number of generation options using sources other than coal. Selection of any of these no-action generation alternatives would result in impacts on labor force, income, infrastructure and services, and public finances to some extent, depending on when and where they would occur. The following general statements can be made regarding the potential social and economic impacts associated with no-action alternatives:



LEGEND

NAVAJO GRAZING COMMUNITIES

1. Adobe Community
2. Kutz*
3. New Indian Irrigation Project
4. Retherford*
5. Carson Community
6. Huerfano Community
7. Bisti Community
8. Otis Community
9. Simpson
10. Sterling
11. Largo Community
12. Lake Valley Community
13. Kimbeto Community
14. Counselor Community
15. Chaco Canyon Ranch*
16. Pueblo Pintado Community
17. Westbrook/IK*
18. Navajo Tribe
19. Sands Springs
20. Carrica*
21. Rincon Marquis
22. Sim Ranch*
23. Chee
24. Elkins*
25. Star Lake Community
26. Castillo Community
27. White Horse Lake Community
28. Becenti Community
29. Little Water Community
30. Casamero Lake Community
31. Willeto

NON–INDIAN ALLOTMENTS

A. 44 Allotment
B. Paragon Resources
C. Blancett
D. R.V. Johnson Escavado
E. Albers
F. Tanner
G. Phil Harris
H. Jacobs

SOURCE: Navajo Tribe and BLM, 1982; *–Navajo Tribe.

Map 9-2. NAVAJO GRAZING AREAS WITHIN PROJECT AREA

Table 9-5. NUMBER OF INDIVIDUAL NAVAJOS HOLDING GRAZING LICENSES IN AREAS CROSSED BY NMGS ANCILLARY FACILITIES

Proposed Route	Number of Individual Navajos	Area Crossed	Proposed Route	Number of Individual Navajos	Area Crossed
T1	0	Paragon Resources[a]	P1	0	Paragon Resources
	19	Otis Community		18	Bisti Community
	82	Kimbeto Community		45	Navajo Indian Irrigation Project
	39	Largo Community		13	Adobe Community
	0	R.V. Johnson Escavado[a]			
	66	Counselor Community	P2	0	Paragon Resources
	48	Star Lake Community		18	Bisti Community
	20	Castillo Community		45	Navajo Indian Irrigation Project
				0	Kutz (Navajo Tribe)
T2	0	Paragon Resources[a]			
	48	Lake Valley Community	P3	0	Paragon Resources
	82	Kimbeto Community		19	Otis Community
	9	Chaco Canyon Ranch (Navajo Tribe)		24	Carson Community
	46	Pueblo Pintado Community		16	Huerfano Community
	0	Tanner[a]		7[c]	Retherford (Navajo Tribe)
	1[b]	Chee		0	44 Allotment[a]
	8	Elkins (Navajo Tribe)		0	Kutz (Navajo Tribe)
	48	Star Lake Community			
	20	Castillo Community			
T3	0	Paragon Resources[a]			
	48	Lake Valley Community			
	7	Westbrook-IK (Navajo Tribe)			
	26	White Horse Lake Community			
	1[b]	Willeto			
	3	Sim Ranch (Navajo Tribe)			
	48	Star Lake Community			
T4	0	Paragon Resources[a]			
	48	Lake Valley Community			
	7	Westbrook-IK (Navajo Tribe)			
	63	Becenti Community			
	1[b]	Jacobs			
	52	Little Water Community			
	0	Albers[a]			
	0	Phil Harris[a]			
T5	18	Bisti Community			

Sources: Dan S. Charlie, Navajo Coordinator/Range Technician, U.S. Bureau of Land Management, Farmington Resource Area Headquarters, 1982; Helen Murphy, Branch of Land Operations, Eastern Navajo Agency, 1982; Edison Wood, Research Analyst, Navajo Tribe, 1982; Leo Beno, Range Conservationist, Navajo Tribe, 1982.

[a] Non-Indian allotment with no Navajos holding grazing licenses.

[b] Grazing in area is controlled by one Navajo family.

[c] Only three individuals exercised their lease option.

- Impacts on any one community would be less with a decentralized coal-fired steam electric system. The plants would be smaller and would be built at different time periods or different locations. Work-force-related demands on community infrastructure and services would be reduced, as would revenue benefits to affected jurisdictions.

- It is assumed that the coal conversion alternative would require a larger construction and operation work force than NMGS. Depending on the location of a coal conversion facility, economic and demographic effects would be greater, resulting in greater impacts to community facilities and services, and potentially to lifestyles and values.

- Impacts associated with a geothermal plant would be less substantial than those identified for NMGS, because work-force size would be smaller, multiple power plant units would be developed sequentially, with each 50-MW unit requiring a work force of approximately 300 during construction and 100 during operation.

- The construction work force with a nuclear plant would be larger than the anticipated NMGS work force, resulting in higher projected in-migration and greater demand for community infrastructure and services. Operations staff would be smaller. A nuclear facility could increase the projected tax base in affected jurisdictions more than NMGS.

- An out-of-state power source would displace social and economic impacts from northern San Juan County to other states, if construction of new electrical generating facilities is required.

- The renewable-resource alternative would disperse social and economic impacts over a wider area because of the smaller scale and greater location options associated with renewable-resource developments.

DELAY-OF-ACTION ALTERNATIVE

Alteration of the proposed construction schedule for NMGS units would alter the projected social and economic impacts identified for the project. Delay of construction of units 2, 3, and 4 by 1 year would have a beneficial impact because employment needs on other major projects in northern San Juan County are expected to decrease in 1991, 1992, and 1993. If NMGS work-force needs were higher in those years, worker in-migration would be less, and local unemployment would be reduced.

If construction of units were delayed so that peak NMGS employment demand coincided with high labor demand from other projects in the region (e.g., 1987, 1989, 1996, 1997), social and economic impacts would be more adverse. Greater in-migration of new workers to the area would result in increased demand for community facilities and services. Housing, schools, human services, and traditional lifestyles in the affected region would be strained.

Delays between construction of NMGS units would generally have an adverse effect on social and economic conditions in the affected region. Unless they are assured of continued local employment opportunities, workers are likely to migrate out of the area as NMGS needs taper off as individual units are completed. This would aggravate fluctuations in local population.

POSSIBLE NEW TOWN

1.0

AFFECTED ENVIRONMENT

The possible new town site would be located in an area (Map 1-1) that is currently uninhabited and supports domestic livestock grazing. The nearest existing communities are Farmington, Aztec, Bloomfield, and other unincorporated communities in northern San Juan County, and Crownpoint and Thoreau in McKinley County. Regional social and economic conditions are described in the NMGS EIS.

2.0
ENVIRONMENTAL CONSEQUENCES

While a new town is not proposed as part of the NMGS project, land in the Bisti area has been set aside for potential new town development in case the need for it is demonstrated in the future. If a new town were to be built in the 1980s it would be viewed unfavorably by some residents of Farmington, Aztec, Bloomfield and the unincorporated communities in northern San Juan County. The greater Farmington area seeks growth, and should be capable of managing and accommodating projected growth based on the future projections analyzed in this report. If a new town were constructed near Bisti, its residents would probably continue to rely on the Farmington area as a primary source of retail goods, services, and entertainment; but Farmington and other communities would not benefit from increased population growth, an extra measure of economic stability, and a broader tax base.

Northern San Juan County would potentially benefit from new town construction only if the pace of energy development were to increase substantially beyond the levels projected in this analysis. If, for example, numerous simultaneous developments caused the regional population to "boom," northern San Juan County communities might not be able to accommodate all of the growth easily. The result would be "boomtown" conditions in the Farmington area--shortages of housing and necessary services, and a variety of other social and economic stresses.

Some NMGS workers might perceive new town construction as a benefit because it could provide better and/or less expensive housing than would be available in the Farmington area, and because it would eliminate commuting (and its associated time, costs, and hazards). New housing stock in the new town would be in better condition than existing housing in Farmington, and would probably be made attractive by developer subsidies, at least initially. Many people, however, might still prefer residing in an older, established community with a full range of services.

In theory, Navajos would benefit from a new town because it would provide housing and other amenities better than those available in Reservation communities, as well as easy access to jobs. In practice, however, Navajos have preferred to stay in communities on or near the Reservation. Only about 5 percent of Farmington's population, for example, is Navajo, compared to 35 percent county-wide. Thus, Navajos seeking employment are likely to prefer commuting from Shiprock or Crownpoint, rather than trying to integrate into a modern Anglo community. Furthermore, more traditionally oriented Navajos who use the checkerboard area would certainly perceive the new town as an intrusion on their opportunities to continue traditional pursuits, including grazing and private ceremonies.

Appendix A

EMPLOYMENT AND POPULATION PROJECTIONS

OVERVIEW

The population projections developed for this study are essentially based on projected employment. Two sets of population projections were made:

- Population in San Juan and McKinley counties without the proposed action (baseline population)
- Population in San Juan and McKinley counties with the proposed action

The first set of population projections (without the proposed action) was based on a combination of the natural population growth (births minus deaths) in the two-county study region and in-migration resulting from the employment associated with the construction and operation of several projects that were determined to have a reasonable probability of developing in the area.

For the second set of projections, population changes induced by the construction and operation of the proposed action were added to the baseline population. Project-induced population changes were projected by first determining the direct and indirect employment impacts of the proposed action. Direct employment figures were provided by PNM. Indirect employment was estimated through the use of an input/output model developed by Dr. John McKean for the Bureau of Land Management. Employment impacts were translated into population changes through a process which considered the availability of labor in the two-county study region, the household sizes of in-migrating construction and operation workers, and the number of additional workers in in-migrating worker households.

The following pages describe in detail the methods used to make the two sets of population projections. A description of the methods used to allocate the projected populations to specific communities within the two-county study region continued in Appendix B.

POPULATION WITHOUT PROPOSED ACTION

Population projections for the two-county study region without the proposed action were based on a combination of natural population growth (births minus deaths) and migration resulting from probable economic developments in the area. The rate of natural population increase in San Juan County was projected to be 1.2 percent per year. For McKinley County, growth rates in the range of 1.4 to 1.6 percent were used. The basis for the growth rates was professional judgment based on a review of natural increases during the period 1960 through 1980.

In order to determine development-induced population change, a list of potential projects in northwestern New Mexico and southern Colorado was compiled. This list was used to create two projected existing environments in 1985. The first, called Baseline 1, includes those projects for which permits have already been obtained. The second, called Baseline 2, adds projects for which permits have been applied but not yet received. The projects included in Baselines 1 and 2 are listed in Appendix C of the EIS.

Once the two lists had been compiled, the projects were evaluated to determine their potential impact on the areas of San Juan and McKinley counties judged to be most likely to be affected by the proposed action. In each list, some projects were felt to be too distant from the impact area of the proposed action to have any measurable impact (either by drawing labor from the area or causing in-migration to the area).

When this analysis was completed, it was found that Baseline 2 contained very few projects that were likely to be of importance to social and economic conditions in the study region. That is, there would be very little population or employment effect from these projects in the area of interest. Therefore, subsequent analysis concentrated on Baseline 1.

The next step was to determine the scheduling and work-force requirements for the relevant Baseline 1 projects.* This was done through telephone contacts to each company.

Indirect employment resulting from each project was then estimated using employment multipliers for the appropriate economic sector. The employment multipliers were derived from the input/output model described in the following section.

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*For Baseline 1, it was assumed that employment in the uranium and oil and gas industries in the two-county study region would remain at current levels. The uranium industry is currently depressed and there are frequent announcements of cancellations of orders for new nuclear power plants and the "mothballing" of plants under construction. These facts, combined with the very long lead times needed for nuclear power plant construction, led to the assumption of no growth in uranium production. Although deregulation and price increases have resulted in increased oil and gas exploration employment in recent years, it was felt that this trend would not continue in the study region for the next 20 years, primarily because once deregulation is complete it will become profitable to produce oil and gas from existing wells (which formerly produced price controlled "old" oil and gas). With production coming from existing wells, the need for exploration is reduced.

Migration was then estimated based upon an evaluation of the local availability of labor. For example, if one construction project was beginning at the same time that another was concluding, it was assumed that workers from the completed project would take jobs on the new project.

The next step was to determine the population effects of the employment-induced migration. This was done using the same method used for proposed action employment-induced population described in the following section.

Finally, population migration was added to the population level attributed to natural growth to arrive at the area population without the proposed action.

POPULATION WITH PROPOSED ACTION

Population with the proposed action was projected by combining the changes in population induced by the construction and operation of the NMGS with projected population without the proposed action. Project-related population changes were based on proposed action construction and operation employment.

The proposed action would create employment not only directly for construction and operation of the power plant, transmission lines, and pipeline, but indirectly as the result of local purchases of materials and services and of local spending by construction and operation workers. In order to determine the indirect employment effect, the BLM input/output model was used.

The data for the two-county input/output model developed for this study were obtained by adjusting a national model by means of location quotients and aggregating techniques. The national model, or base model, used in this process contains 496 economic categories or subsectors of the economy, 483 of which represent the private economy and 13 of which represent other activities, including the public sector. The 496 private subsectors were used in the model; the government impact was computed using four of the public subsectors. The national base model is a 1972 National Input-Output Model constructed by the Department of Commerce, Bureau of Economic Analysis (BEA).

Several important aspects of the model for San Juan and McKinley counties should be noted. First, detailed information on employment, by category, was determined from information supplied by the New Mexico Employment Security Department (NMESD). Using this information, detailed location quotients for manufacturing were determined at the four-digit "SIC" Code level; this added credibility and accuracy to the modeling process.

Second, because of the makeup of retail and wholesale subsectors within San Juan and McKinley counties, a detailed analysis of the types of outlets located within the area was conducted. Basic information from the 1977 Census of Business was used with updated information from the employment files for this analysis.

Finally, once the location quotients had been determined, 1977 Census data and various other state and local data sources were used to identify output per employee for many of those subsectors with location quotients computed through employment statistics. A total output figure was derived for these subsectors. In turn, the total output figures and employment levels were used to aggregate the 493 subsectors in the base model into 37 private business subsectors and one governmental subsector for the regional model.

Employment multipliers can be determined in the BLM modeling process by a change in final demands. For example, for the operational phase impact estimates, a series of by-sector final demand changes were input to the model. As a result of these changes, the model-generated employment estimate was increased from 49,542 to 49,808. This is a change of 266 in the employment level. The change in final demands input to the model represented activity relative to 200 direct operations employees.

The employment multiples therefore would be determined in the following manner:

$$M_E = \frac{\text{Direct employment change and indirect employment change}}{\text{Direct employment change}}$$

or

$$M_E = \frac{200 + 266}{200} = 2.33$$

Thus, for each 100 project-related operation employees, an additional 133 indirect jobs would be supported in the two-county study region.

Once direct and indirect employment were determined, the next step was to project the population migration associated with the employment. The calculations for each year are too extensive to give here. However, sample calculations and formulas are give below that illustrate the procedure for determining the annual population impact.

Calculations are made in three major parts. The first part of the calculation is the consideration of the population that is expected to move into the area due to the construction activity of the proposed action. The formulas are as follows:

$$CON_{1986} \times MigCON_{A} = JM_{1986}$$

$$[715 \times 0.20 = 143]$$

$$MCWH_{1986} \times CWHSZ = MCP_{1986}$$

$$[143 \times 2.2 = 315]$$

where

CON_{1986} = the total number of project-related construction jobs in 1986

$MigCON_{A}$ = the proportion of total construction jobs expected to be filled by newcomers to the area. The factor varied from 0.20 to 0.54 and was derived from Construction Worker Profile figures for the Four Corners Region in 1975 (Arizona, Colorado, New Mexico, and Utah)

JM_{1986} = the total number of jobs expected to be filled by newcomers to the area

$MCWH_{1986}$ = the number of expected newcomer construction worker households to the area in 1986

$CWHSZ$ = the average size of newcomer construction worker households (2.2--reduced slightly from that found in the Construction Worker Profile)

MCP_{1986} = the expected number of individuals migrating directly due to jobs in construction of the proposed action in 1986

The sources of data are extremely important in computing the population in-migrating to take new jobs for construction and operation of the proposed action. The average number of employees by year for construction or operation was derived from data supplied by PNM. The proportion of new jobs expected to be filled by newcomers to the area was derived from the Old West Regional Commission (OWRC) study entitled Construction Worker Profile. That study involved 14 large construction projects (6 projects in the Four Corners Region) and showed that the percentage of local workers varied from a high of more than 79 percent to a low of 3.3 percent for all projects and a high of 79 percent to a low of 32 percent for the 6 projects in the Southwest (Arizona, Colorado, New Mexico, and Utah). The average percentage of local workers employed on the project in the Four Corners Region was 46.1 percent, indicating that 53.9 percent of the construction workers were not residents of the area before the construction activity. As was the case for projections without the proposed action, the percentage of nonlocal construction workers used in this study varied depending on the projected availability of construction workers in the local labor market area. The percentages used were 20 percent in a surplus year, 35 percent in a normal year, and 54 percent in a projected shortage year.

Having completed the calculations to determine the population in-migration due directly to construction activity, the change due to operation was computed. This was determined in the same way and is given by the following formulas:

$$\mathrm{NMGSO}_{1990} \times \mathrm{MigOPP} = \mathrm{JM}_{1990}$$

[170 x 0.50 = 85]

$$\mathrm{MOWH}_{1990} \times \mathrm{AVHSZ}_{1990} = \mathrm{MOP}_{1990}$$

[85 x 2.8 = 238]

where

$NMGSO_{1990}$ = the total number of project-related operation jobs in 1990

$MigOPP_{1990}$ = the proportion of total operation jobs expected to be filled by newcomers to the area; the factor 0.5 was used

$MOWH_{1990}$ = the number of newcomer operation worker households in 1990

$AVHSZ_{1990}$ = the average size household for the in-migrating operation workers

MOP_{1990} = the in-migrating population due directly to operation jobs connected with the proposed action

Again, sources of information for the formulas above are extremely important. The direct operation employment was determined from information supplied by PNM. The proportion of operation jobs to be filled by newcomers to the area was assumed to be 0.50. Literature searches indicated no directly applicable research projects that would give the average number of operation jobs filled by newcomers to the area. In order to determine this factor, New Mexico Employment Security Department job applicant records, currently available occupational skill levels, and needed occupations and skill levels for the operation phase were reviewed.

The average size household figures for newcomers were drawn from the Bureau of the Census publications of projected household sizes and family sizes. The figures used within the calculations were derived from Series I population figures and Series D household sizes. These are the high-range household sizes of the 12 projections listed by the Bureau of the Census in Current Population Reports, Series P-25, No. 805, May 1979. However, in order to simplify the calculation, a constant size of 2.80 was used.

The final set of calculations needed to determine the overall population migration was that of population-taking jobs generated indirectly by the construction and operation activities of the proposed action. These population changes were computed in a manner very similar to the previous calculation, with one major exception: construction workers and operation workers who move into the area bring with them other household members. Certain of these household members take up employment in other areas of the economy. These people must be accounted for in determining the overall migration of individuals to the area. Thus the following formulas differ somewhat from the previous calculations:

$\mathrm{IDE}_{1986} \times \mathrm{MigID} = \mathrm{IDJM}_{1986}$

$[518 \times 0.40 = 207]$

$\mathrm{IDJM}_{1986} - \mathrm{ADCE}_{1986} - \mathrm{ADOE}_{1986} = \mathrm{Net\ IDJM}_{1986}$

$[207 - 30 - 0 = 177]$

$\mathrm{Net\ IDJM}_{1986} \quad \mathrm{HWF} = \mathrm{MIDWH}_{1986}$

$[177 \div 1.3 = 136]$

$\mathrm{MIDWH}_{1986} \times \mathrm{AVHSZ}_{1986} = \mathrm{MIDP}_{1986}$

$[136 \times 2.8 = 381]$

where

IDE_{1986} = the number of new indirect jobs (private and government) supported by construction or operational activity of the proposed action (example year is 1986)

MigID = the proportion of indirect jobs to be filled by newcomers to the area (0.40)

$IDJM_{1986}$ = the number of indirect jobs in 1986 to be filled by newcomers to the area

$ADCE_{1986}$ = the expected number of indirect jobs in 1986 filled by members of the construction workers' households moving into the area to take new construction jobs (0.21 x MCWH)

$ADOE_{1986}$ = the number of indirect jobs filled by household members moving into the area in 1986 to take the operations (0.21 x NMGSO) (Note: No operation jobs in 1986)

Net $IDJM_{1986}$ = the net number of jobs in 1986 to be filled by newcomers moving into the area to take jobs created as an indirect result of the construction and operation of the proposed action

HWF = the factor which accounts for more than one worker per households (1.30)

$MIDWH_{1986}$ = the number of expected newcomer households to the area in 1986 due primarily to jobs in sectors indirectly affected by the construction and/or operational activity of the proposed action

$AVHSZ_{1986}$ = the average household size in 1986 of individuals moving into the area for jobs created to the indirectly impacted economic activities

$MIDP_{1986}$ = the population moving into the area in 1986 for jobs in sectors indirectly affected by proposed action construction and operation

From the above formulas, it is apparent that several new characteristics have entered the calculations for determining population. IDE was determined from calculations explained above. It is a direct result of the input-output modeling process. MigID is a subjective number based upon an evaluation of the area in terms of labor availability and needed skill levels associated with indirect new jobs. In this case, the factor used was 0.40, which indicates that 40 percent of the new jobs created in indirectly affected sectors are projected to be filled by newcomers to the area.

As workers move into the area to take up positions in the construction or operational work forces, they bring with them households that contain members who also become part of the labor force and are available to fill newly created positions in the area under impact. ADCE accounts for those additional workers brought by construction worker households. The OWRC Construction Worker Profile indicated that between 21 and 22 additional workers for each 100 newcomer construction worker households would take jobs in indirectly affected sectors. In this study, a factor of 0.21 was used to determine the number of additional workers for each household in-migrating due directly to construction and operation activity. It is also apparent that when households move in and take up positions in sectors indirectly affected by construction and operational activity, there is more than one worker per household. Again, the OWRC Construction Worker Profile places this number at 30 to 31 additional workers for each 100 households migrating. Thus, for 100 households, approximately 130 workers would be available for positions in indirectly affected sectors. In order to account for these multiple-worker households, a factor of 1.3 was used to decrease the number of needed households moving into the area.

Finally, in order to determine the actual population of the resulting households moving into the area, the projected average household size from the Bureau of the Census publications of projected household and family size was used, specifically Population Series I and Household Series C. To simplify calculations, a constant size 2.8 was maintained.

A final word of caution should be provided. The sample calculations for 1986 above are for impact during the second year of construction. The annual number of people moving into the area in following years is not necessarily the same. Calculations must also be made for each succeeding year.

Appendix B
POPULATION ALLOCATION

Population impacts due to developments identified in Baseline 1 and due to the construction and operation of the proposed action were distributed to subcounty areas using a gravity-flow formula. After several gravity-flow formulas were examined, the final formula to be chosen was a simple population/distance formula. That formula is illustrated as follows:

$$IP_i = \left(\frac{BP_i}{RM_i} \div \sum_{i=1}^{n} \frac{BP_i}{RM_i} \right) \times IP$$

(i = 1,..., n, communities)

IP_i = the number of people expected to locate in community i as a result of the construction or operation of an identified project.

BP_i = the baseline population of community i

RM_i = the road miles from the project site to community i

IP = the newcomer population expected to locate in all identified communities

In this formula the number of newcomers expected to locate in the various identified communities is directly related to the size of the community and inversely related to the distance between the project site and the community. The effect of both the population and the distance is linear.

In order to simplify the calculations, baseline populations for the communities were held constant at either the 1980 or 1985 Baseline 1 level, depending upon when the impact of Baseline 1 would be the greatest. For the proposed action impact, the baseline population was established at the 1985 level. The newcomer population expected to locate in all identified communties was assumed to be 90 percent of the identified total newcomer population. The remaining 10 percent was, therefore, redistributed throughout areas within the two counties outside of the identified communities.

As can be seen from Table 3-9, the number of identified projects from Baseline 1 was extensive. The development of gravity-flow formulas on an annual basis for each of these projects would have been a tedious undertaking and would not have necessarily added to the overall credibility or accuracy of the study. Area-specific gravity model coefficients for five different areas in the two counties were used to distribute population impacts due to the projects identified in Baseline 1.

The population impact due to the construction and operation of the proposed action was distributed based upon the following gravity-flow coefficients:

Proposed Action Population Distribution Coefficients

Community	Coefficient
Farmington	.625
Aztec	.070
Bloomfield	.078
Flora Vista	.059
Lee Acres	.071
Lower Valley	.066
Crownpoint	.018
Thoreau	.012

As can easily be seen, Farmington is expected to receive the major impact (62.5%) while both the incorporated cities of Aztec and Bloomfield and the unincorporated areas (Flora Vista, Lee Acres, Lower Valley) in San Juan County would also receive significant impact (34.4%). The identified unincorporated communities of Crownpoint and Thoreau in McKinley County would receive very little impact--a total of 3.0%. Even this 3.0% for those communities may be a somewhat liberal figure given the availability of private land, community amenities, and known constuction worker location patterns.

Appendix C

FISCAL PROJECTION METHODS

OVERVIEW

The basic objective of the fiscal projections was the determination of the impact of the proposed action on government revenues and expenditures. Thus, although both baseline and impact projections were produced, the baseline projects were intended primarily to provide a frame of reference for the impact projections.

All revenue projections were based on the assumption that the revenue structure of the government unit would not change over time. That is, it was assumed that tax rates, fees, and transfer allocation formulas would remain the same throughout the projection period. Revenue changes were based on changes in such things as the value of property, volume of sales, and population. Similarly, expenditure projections were based on the assumption that the per unit service levels for the various government activities would not change and that the per unit costs of the services would remain the same throughout the projection period. Changes in expenditures were based on changes in such things as population or business activity.

Thus, the fiscal projections were primarily intended to indicate the impact of the proposed action given the present revenue and expenditure structure of the various government units being analyzed, where the present structure is defined as that which is reflected in the record of revenues and expenditures of the most recently completed fiscal year.

It should also be noted that the projections are in constant dollars reflecting price levels as of the most recently completed fiscal year. In the case of the proposed action, this was FY81.

The following sections describe the specific methods used in projecting municipal, county, and school district revenues and expenditures.

MUNICIPAL FINANCES

The methods used to project municipal revenues and expenditures are derived, at least in part, from methods explained in The Fiscal Impact Handbook (Robert W. Burchell and David Listokin, The Center for Urban Policy Research, New Brunswick, New Jersey, 1978). The methods developed in the Handbook have been modified considerably over several years by Adcock and Associates, Inc., to suit the requirements of the socioeconomic component of an Environmental Impact Statement.

There are six basic steps to the projection of municipal revenues and expenditures:

- Determine present revenue and expenditure levels, property values, and tax rates
- Determine present levels of base factors
- Project changes in base factors

- Project capital requirements
- Determine per unit revenues and expenditures
- Project changes in revenues and expenditures

The data for step one are obtained from records of the municipal government. In New Mexico, the source is the "Municipal Quarterly Report" for the fourth quarter of the fiscal year. This document contains a detailed accounting of municipal revenues and expenditures for all budgeted funds.

These funds are then sorted into the general categories of operating funds, enterprise funds, and capital funds. Operating funds are those funds to which most general municipal revenues accrue and from which most general expenditures are made. Enterprise funds cover municipal operations, such as water or refuse, for which revenues are generally user charges set so as to cover costs. Capital funds are generally special funds set up to account for specific capital expenditures such as sewage plant construction. In addition to the present revenues and expenditures, information on property values and municipal tax rates is compiled.

The second step in the projection process is the determination of the present levels of the base factors, that is, those factors which, given the present revenue structure and service levels, determine the levels of revenues and expenditures. These factors include municipal population, households, housing stock, and the market area population. This latter base factor is used as a proxy for the actual bases for many revenue and expenditure items such as nonresidential property taxes, gross receipts taxes, and public safety expenditures incurred to protect nonresidential property. The information on the various base factors is generally accumulated as part of the process of determining the existing conditions in the study area.

The third step in the process is the projection of the changes in the base factors. The population projection method is described in Appendix A. The projection of the number of households is based on projected population and household size projections. Baseline household size is based on current household size in each area and changes in household size projected by the Bureau of the Census. Impact household size is taken from the Construction Worker Profile. For in-migrant construction workers, a household size of 2.2 was used. For in-migrant operation workers and other (indirect) workers, a household size of 2.8 was used. The total housing stock is based on the number of households and an assumed vacancy rate, and the housing stock by type of housing unit is based on information in the Construction Worker Profile. The required projections of the base factors are accomplished as part of the analysis of conditions in the impact area with and without the proposed action.

The fourth step is the determination of capital spending requirements. This determination is based on the analysis of the community facilities. The capital spending requirements analysis is limited to those facilities required as a result of the proposed action. A complete capital requirements analysis under baseline conditions would require a level of effort roughly equal to that needed for the preparation of the entire economic component of the Environmental Impact Statement, and is therefore judged to be beyond the scope of work justified for the preparation of the economic component.

Once the data collection is completed and projections of base factors and capital facilities requirements have been made, the magnitude of the impact of the proposed action on the enterprise funds is estimated. This is done to determine whether or not formal projections of fiscal impacts on enterprise funds are warranted. Formal projections are produced if the proposed action would result in significant investments in enterprise capital facilities or if the proposed action would result in a significant change in the service structure (e.g., the proportion of residential versus nonresidential customers) of the enterprise compared to the baseline case. If neither of these impacts is projected to occur, it is generally the case that the impact of the proposed action (relative to the baseline case) would be increases in enterprise operating revenues and expenditures approximately in proportion to the population increase associated with the proposed action. In such cases, formal enterprise fiscal projections are not warranted, and none are made. In the specific instance of New Mexico Generating Station, the impacts on the enterprise funds were found to be too small to justify formal projections of fiscal impacts on enterprise funds.

The fifth step in the analysis is the determination of the per unit revenues and expenditures. For the most part, this consists of simply dividing the individual revenue or expenditure base year value by the base year value of the appropriate base factor. The base factor used for each specific revenue and expenditure item is indicated in Table C-1.

There are two important exceptions to the use of base year actual revenues as the basis for the per unit calculation. Probably the most important is the residential property tax. The per unit property tax is determined by multiplying the property tax rate by the assessed value for each of three housing unit types (conventional single family, multifamily, mobile home).

Table C-1. MUNICIPAL FISCAL BASE FACTORS

Municipal Population Base

- Licenses and permits (ex. bldg. perm.) (0)
- Charges for services (0)
- Fines and forfeits (0)
- General fund misc. (0)
- Federal grants (1 1/2)
- State grants (1 1/2)
- General government—residential portion (0)
- Public safety—residential portion (0)
- Public works—residential portion (1/2)
- Health and welfare (1/2)
- Recreation and culture (0)

Household Base

- Franchise tax—residential portion (0)

Other Bases

- Gas and oil taxes
- Lodgers' tax
- Local transfers
- Interest on investments
- Debt service

Market Area Population Base

- Property tax—nonresidential portion (1 1/2)
- Franchise tax—nonresidential portion (1 1/2)
- Occupation tax (1 1/2)
- Gross receipts tax* (0)
- Gasoline tax (0)
- Auto license distribution (0)
- Cigarette tax distribution (0)
- General government—nonresidential portion (0)
- Public safety—nonresidential portion (0)
- Public works—nonresidential portion (1/2)

Housing Stock Base

- Property tax—residential portion (1)

Change in Housing Stock Base

- Building permits (0)

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*Plus tax on local purchases for impact.

Numbers in parentheses indicate time lags.
0: Revenue or expenditure depends on base factors in mid-fiscal year.
1/2: 6-month lag.
1: 12-month lag.
1 1/2: 18-month lag.

The other major exception is the General Fund miscellaneous revenue category. This category occasionally contains large non-recurring revenue items. These items are not included when computing the per unit amount.

The final step is the projection of revenues and expenditures. In cases where enterprise fund projections are not made, the projections are limited to operating funds. Projections of capital fund revenues and expenditures, per se, are not made because the fiscal projections are on what is essentially an accrual rather than a cash basis. Thus, a typical capital purchase, financed by the sale of bonds and paid for over a period of a year or two by cash payments to a contractor, is accounted for through debt service (principal and interest payments) for the life of the bonds. Thus, the effect of capital spending is reflected in changes in debt service requirements which appear as operating funds (or enterprise funds) expenditures.

Most operating funds revenues and expenditures are projected by simply multiplying the permit amount by the projected level of the appropriate base factor. As indicated in Table C-1, different time lags are used for the various revenue and expenditure categories. Otherwise, the process is straightforward.

For the most part, the actual computations are done by computer. There are, however, a few items which are calculated independently and then read into the computer program. One of these is debt service. As indicated above, a detailed capital spending analysis is conducted only for the impact of the proposed action. The amount of capital spending required is converted into a debt service requirement using an assumed interest rate and an assumed bond life. The debt service is assumed to begin in the year that the analysis indicates that the capital facility would be required. On the other hand, debt service for the baseline case is based on the payout schedule for existing bonded debt. Debt service resulting from future capital spending under baseline conditions cannot be included since baseline capital spending projections are not made. Therefore, the baseline projection underestimates future expenditures by an amount equal to any debt service requirements incurred in the future.

Four other revenue items are computed independently. These are gas and oil taxes (a combination of property and severance taxes), the lodgers' tax, local transfers, and gross receipts taxes resulting from the proposed action. Gas and oil and lodgers taxes were assumed to remain unchanged under baseline conditions and were assumed to equal zero (no impact) for the impact projections. Local transfers were treated differently for each community. The amounts of the local transfers are too small, however, to warrant discussion of the individual assumptions. For the impact projections, gross receipts tax revenues on estimated local purchases associated with the proposed action were added to the market area population based projected gross receipts taxes.

The final computation made is the interest on investments. This is determined by subtracting all expenditures from all revenues (except interest income) and computing interest on the balance. For the analysis of the proposed action, two separate sets of projections were made, one assuming that interest income was earned at a rate of 10 percent, and one assuming a zero interest rate. The latter projection provides a clear indication of the conditions in a given year since it does not count as current revenue the interest income derived from excess revenues accumulated in previous years.

COUNTY FINANCES

Ordinarily, the projection of county finances is based on methods which are similar in most respects to those used for municipal finances. The major difference is that counties do not in general have enterprise operations so the steps described above for dealing with municipal enterprise funds do not apply.

In the case of the proposed action, however, the methods were simplified considerably. This was done because a preliminary evaluation of the fiscal impacts of the proposed action indicated that the magnitude of the property taxes generated by the proposed action would be considerably greater than the magnitude of all expenditures and of other revenue sources combined. In effect, the total of the estimated impact on expenditures or revenues other than the property tax was judged to be within the error range of the property tax projections. Thus, it was determined that very simple methods were appropriate for the projection of county fiscal conditions.

With the exception of the property tax, oil and gas taxes, and interest on investments, all county revenues and expenditures were projected on a per capita basis. As was the case in the municipal projections, some extraordinary miscellaneous revenue items were excluded from the per capita base. Some other miscellaneous revenues were projected to show no change under baseline conditions and to be unaffected by the proposed action. Similarly, oil and gas taxes were assumed to remain unchanged under baseline conditions and be unaffected by the proposed action. Interest on investments was assumed to be zero for both baseline and impact projections because projections were made only for five year intervals, which prevented computation of interest income from annual surpluses.

Property taxes were projected on a per capita basis under baseline conditions. The impact of the proposed action on county property taxes was projected based on a combination of the proposed construction schedule, estimated construction costs, and present property tax rates. The projected assessed valuation of project-related facilities is shown in Table C-2. Changes in the value of residential and other nonresidential property resulting from the construction and operation of the proposed action were also considered.

SCHOOL DISTRICT FINANCES

The method used to project school district finances generally includes the same six steps outlined above for municipal finances. In application, the projection of school district finances is somewhat less complex than that for municipal finances because of the relative simplicity of school district financial structure, but the basic approach is the same.

The data for the school district financial analysis is taken from school district financial records, projections of base factors made as part of the analysis of impacts on school facilities and services, and other projections contained in Chapters 3 and 4 of this report. Table C-1 indicates the base factors used for each revenue and expenditure category.

Ordinarily, the impact of the proposed action on school capital spending would be included in the analysis in the same way that it is included in the municipal analysis. However, in the case of New Mexico Generating Station, it was not possible to obtain current school district capacity data, so it was not possible to determine whether or not the proposed action would require additional school

Table C-2. PROJECTED ASSESSED VALUE OF PROPOSED ACTION (MILLIONS OF DOLLARS)

	Construction Cost Less Depreciation						
Year	Unit 1	Unit 2	Unit 3	Unit 4	Transmission Line	Pipeline	Assessed Value
1984	0.8						0.1
1985	13.3						2.2
1986	55.0						9.2
1987	188.3	0.8				19.2	34.7
1988	321.3	13.3				68.5	78.6
1989	389.6	55.0	0.8		10.4	65.8	99.6
1990	416.7	188.3	13.3		9.9	63.0	196.8
1991	400.0	321.3	55.0		9.5	60.3	219.3
1992	383.4	389.6	188.3	0.8	9.1	57.5	246.5
1993	366.7	416.7	321.3	13.3	8.7	54.8	338.1
1994	350.0	400.0	389.6	55.0	17.6	52.1	347.3
1995	333.4	383.4	416.7	188.3	16.9	49.3	431.3
1996	316.7	366.7	400.0	321.3	16.2	46.6	435.6
1997	300.0	350.0	383.4	389.6	15.5	43.8	429.2
1998	283.4	333.4	366.7	416.7	14.8	41.1	485.3
1999	266.7	316.7	350.0	400.0	14.1	38.4	462.0
2000	250.0	300.0	333.4	383.4	13.4	35.6	438.6

district capital facilities. Therefore, the school district fiscal projections do not include debt service for any additional capital facilities that may be required under baseline conditions or as a result of the proposed action.

Appendix D

TRADITIONAL NAVAJO LIFESTYLES AND VALUES

D.1 INTRODUCTION

- Background and Purpose
- Affected Groups
- Approach
- Anthropological Concepts

D.2 TRADITIONAL NAVAJO VALUES AND LIFESTYLES: A HISTORICAL PERSPECTIVE

- History
- Historical Religion and Worldview
- Historical Social Organization
- Historical Political Organization
- Historical Economy

D.3 TRADITIONAL NAVAJO VALUES AND LIFESTYLES: CURRENT PERSPECTIVE

- Current Religion and Worldview
- Current Social Organization
- Current Political Organization
- Current Economy

D.4 POTENTIAL PROJECT IMPACTS ON TRADITIONAL VALUES AND LIFESTYLES

D.5 TRADITIONAL NAVAJO PERSPECTIVE ON POTENTIAL NMGS ENVIRONMENTAL CONSEQUENCES

- Introduction
- Land Use Controls and Constraints
- Water Resources
- Vegetation
- Minerals
- Cultural Resources

D.6 SUGGESTED MITIGATION

D.7 UNAVOIDABLE ADVERSE IMPACTS

D.1
INTRODUCTION

BACKGROUND AND PURPOSE

This Appendix is one of the products of a process used to assist WCC technical staff in recognizing and understanding potential environmental consequences of the proposed action and alternatives as these might be perceived by members of other culture groups in the affected environment. This is particularly important given that the National Environmental Policy Act (NEPA) requires that potential impacts resulting from a proposed action be assessed from the perspective of the affected population(s).

Because Native Americans in the study region are workers, consumers of goods and services, and users of community facilities and services, they represent a substantial part of the larger community described in the assessment of social and economic conditions above. The traditional values and lifestyles maintained by Navajos in the study region, however, are in some cases substantially different from those maintained by Anglo- and Hispanic-Americans in the region. An attempt was made, therefore, to evaluate traditional Navajo values and lifestyles in order to understand how the proposed action would potentially affect them. Information on the proportion of potentially affected Navajos who maintain traditional values and lifestyles was not available for this study. It was necessary, therefore, to qualify rather than to quantify statements regarding traditional values and lifestyles.

In the affected environment, the potentially affected population includes three main culture groups: Anglos, Hispanics, and Native Americans. Because these groups have lived in proximity for several centuries, some acculturation and assimilation has occurred, although each group has maintained a sense of separate identity that is reflected in distinctive values, lifestyles, and languages. For the most part, the WCC senior technical staff responsible for preparing the NMGS EIS hold values most similar to the "Anglo" American segment of the population potentially affected by NMGS. For this reason, it was felt that the impacts identified by the technical staff would reflect not only their professional opinions but also, generally speaking, Anglo-American interpretations. Furthermore, many of the Hispanic-Americans who currently live in and around Farmington have adopted urban-based lifestyles that would not be directly affected by NMGS in ways other than those identified in this Technical Report. The traditional values held by Native Americans in the project area, however. are substantially different from those of Anglo- and Hispanic-Americans. Thus an attempt was made to develop a better understanding of Native American values and lifestyles in order to identify potential impacts on them as well as to ensure that WCC technical staff would analyze environmental impacts from a point of view that could encompass Native American perspectives.

The importance of understanding traditional Native American values and lifestyles is reinforced by the American Indian Religious Freedom Act of 1976. This Act mandates federal government agencies to consider the effects of their policies and actions on opportunities for Native Americans to practice their traditional religions. In traditional Native American cultures, "religion" is not a separate set of identifiable beliefs and activities. Instead, it is interwoven with all other aspects of culture, values, and lifestyles, as is indicated in sections D.2 and D.3 of this appendix.

The steps taken by WCC to ensure that the NMGS EIS would reflect a sensitivity to Native American values included the following:

- Review of ethnographic sources depicting the traditional cultures of potentially affected Navajo, Puebloan, and Apache groups.

- Review of transcripts and minutes from scoping meetings held with potentially affected Native American groups not only for NMGS, but also for Coal Preference Right Leasing Applications (PRLAs), Wilderness Study Areas (WSAs), etc.

- Review of field notes from BLM's Navajo employees, based on their discussions with local medicine men, grazing permit holders, and other Native Americans living on or using potentially affected lands.

- Discussions with Navajo Tribal officials, government workers, anthropologists, and other key informants who have worked in the affected region for many years.

- Communication of preliminary findings to WCC technical staff at a Native American Workshop held in San Francisco in September 1981.

- Cooperation with Quivira Research Center (QRC), WCC's archaeological subcontractor based in Albuquerque, in the design of a field program that would elicit information on values and attitudes as well as on cultural resources and sacred sites.

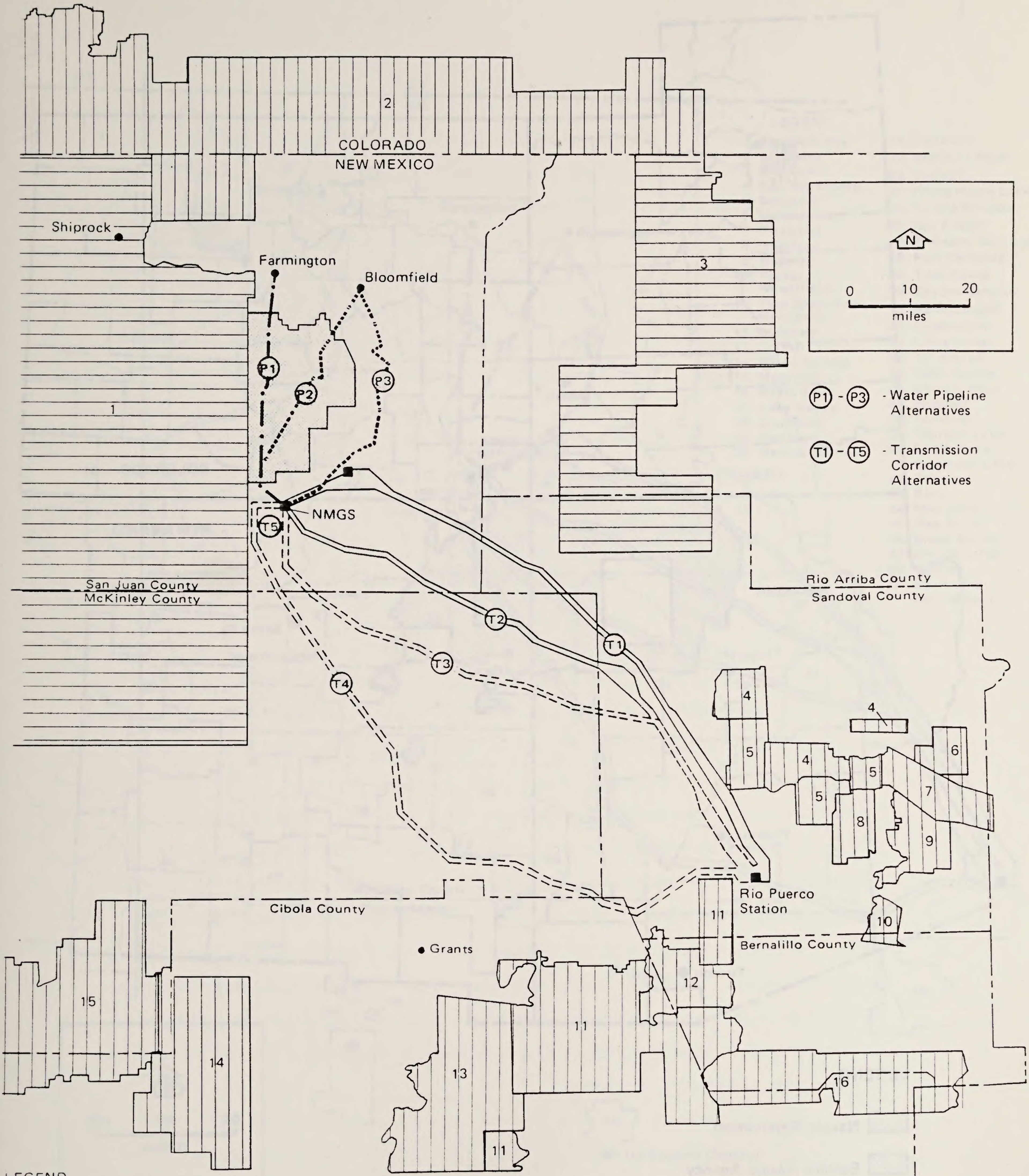
QRC's findings are documented in the Cultural Resources Technical Report, and are cross-referenced in this Appendix where appropriate.

The main purpose of the Cultural Resources Technical Report is to address potential impacts on sites of cultural significance in the project area. while the main purpose of this Appendix is to address potential impacts on traditional values and lifestyles.

AFFECTED GROUPS

Map D-1 shows the location of Indian Reservations within approximately 20 miles of proposed and alternative project components. Based not only on the proposed location of the generating station and ancillary facilities but also on QRC and WCC research findings, interviews, and correspondence with potentially affected groups, it was determined that the Navajos would potentially be the most significantly affected Native American group and that impacts to Puebloan and Apache groups would be negligible. As a consequence, this appendix focuses on the traditional values and lifestyles of the Navajos. Documentation of the full analysis of potential impacts to Native Americans is contained in the Cultural Resources Technical Report and in Background Files for Social and Economic Conditions available through BLM's New Mexico State Office.

Map D-2 shows the general location of the Navajo Nation and the Eastern Navajo Agency boundaries within the Four Corners states. NMGS would be located within the Eastern Navajo Agency, approximately 4 miles east of the Navajo Reservation boundary and 40 miles north of Crownpoint, the headquarters for the Eastern Navajo Agency. NMGS water pipeline alternatives would cross several Navajo grazing communities including Bisti, Otis, Adobe, Carson, and Huerfano (see Map 9-2 in section 9 of this report). Proposed alternative transmission lines would pass through the Navajo communities of Kinbeto, Lake Valley, Pueblo Pintado, Otis, Largo, Castillo, White Horse Lake, Becenti, Counselor, and Star Lake (Map D-3).



LEGEND

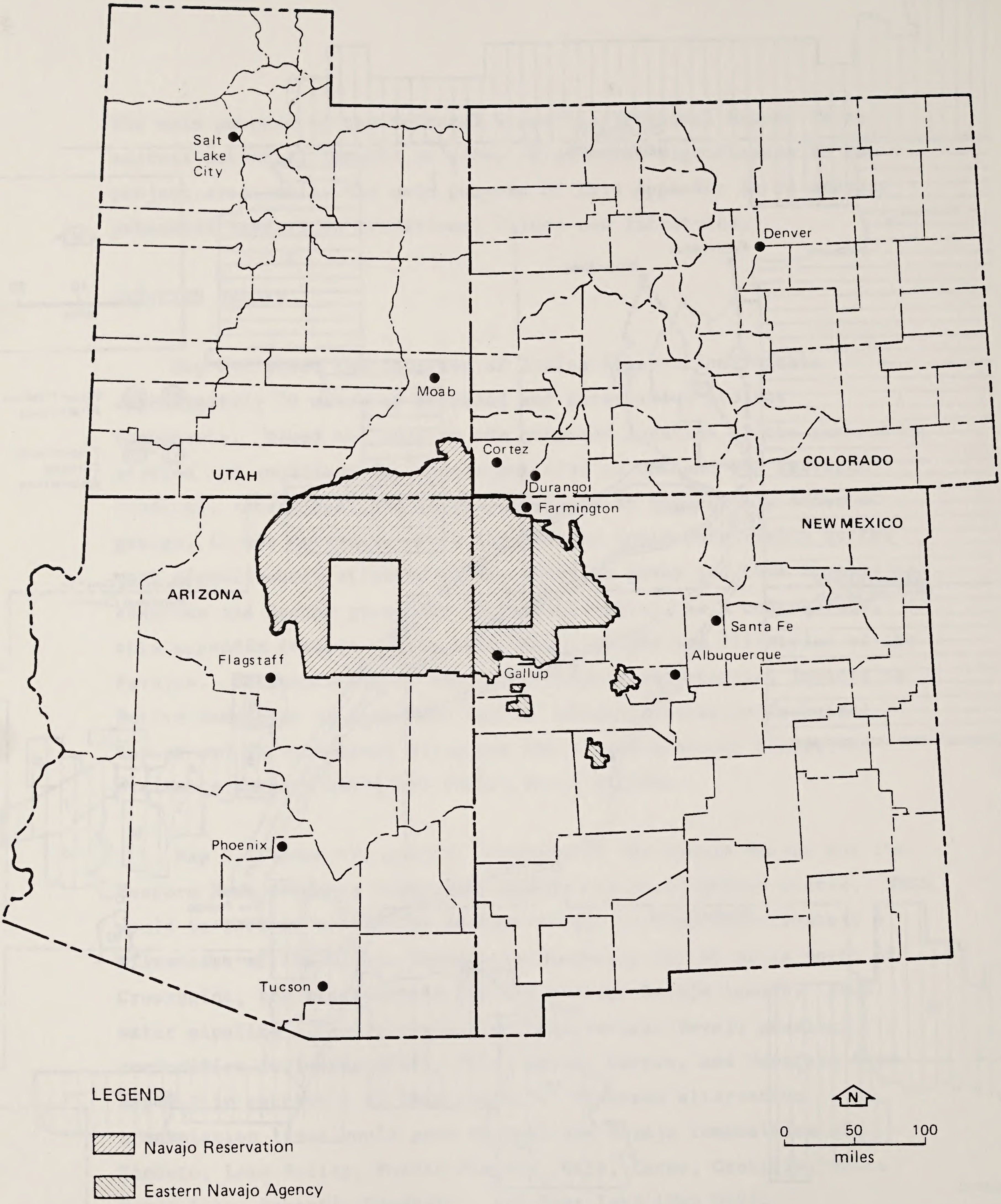
RESERVATIONS

1. Navajo
2. Ute Mountain
3. Jicarilla
4. Jemez
5. Zia
6. Cochiti
7. Santo Domingo
8. Santa Ana
9. San Felipe
10. Sandia
11. Laguna
12. Cañoncito
13. Acoma
14. Ramah
15. Zuni
16. Isleta

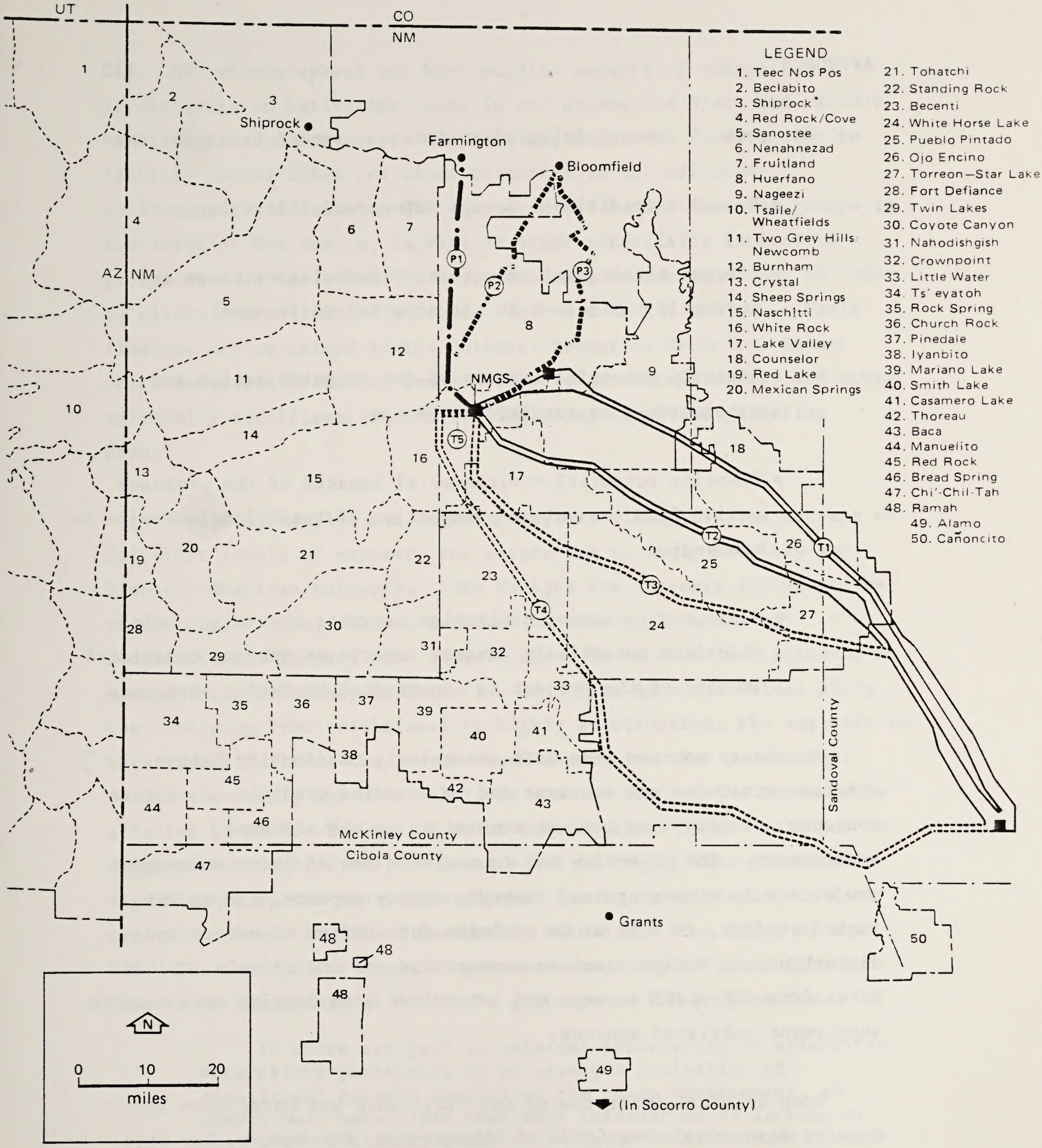
▨ Eastern Navajo Agency

SOURCE: USGS & PNM

Map D-1. INDIAN RESERVATIONS LOCATED NEAR PROJECT COMPONENTS



Map D-2. LOCATION OF NAVAJO NATION



* Shiprock/Natnaii Nez/Cudei/Hogback are now separate chapters but have yet to draw boundaries.

SOURCE: Navajo Tribe

Map D-3. NAVAJO NATION CHAPTERS IN NEW MEXICO

APPROACH

The general process followed in this assessment is as follows:

- Describe traditional Navajo values and lifestyles
- Discuss traditional values and lifestyles as these are currently manifested in the affected environment
- Identify potential impacts of the proposed action and alternatives on traditional Navajos
- Identify potential environmental impacts of the proposed action from the unique perspective of traditional Navajos in the region
- Suggest alternative mitigation measures that might help alleviate potentially adverse impacts or enhance beneficial impacts of the project as interpreted by Native Americans

Secondary sources were used extensively to identify Native American attitudes and concerns and to describe traditional culture contexts, history, and current conditions in the affected environment. The objective was to maximize use of information that now exists in ethnographies, surveys, agency reports, and recent impact studies, as well as to minimize duplication of effort and disturbance to Native American communities and individuals. Field notes from BLM staff surveys and interviews with Navajos were used to supplement published sources.

Some original interviewing and field work was undertaken by Quivira Research Center (QRC) of Albuquerque, New Mexico, for this

EIS. QRC ethnographers who have studied impacts of energy developments on Native Americans in and around the Bisti and various Pueblo areas for many years did some key informant interviewing to identify sacred sites and other resources in the affected environment. In addition QRC contacted all Native American groups in the state of New Mexico, as well as other potentially interested groups outside the state, by correspondence and/or telephone in order to elicit expressions of potential interest in the project. Their findings are contained in the Cultural Resources Technical Report, which describes potential project impacts to archaeological and other culturally significant resources (including important gathering areas).

Navajo lifestyles and values today are widely diverse because of different levels of exposure and adaptation to Anglo-American and Hispanic-American cultures. Some Navajos are strongly influenced by traditional values, while others can be seen to be adopting nontraditional lifestyles. Because there is no empirical evidence to document the frequency distribution of Native American values along the continuum from traditional to highly acculturated, the analysis in this report reflects the "worst-case" assumption that traditional values are deeply and widely held by some of the Navajos potentially affected by NMGS. The use of worst-case analysis is not intended to exaggerate potential project impacts but to ensure that potentially significant impacts are not overlooked due to uncertainties or data gaps that cannot be filled reasonably within the time frame of the EIS. The mandate for conducting worst-case analyses comes from the Council on Environmental Quality's guidance on EIS preparation:

> If there are gaps in relevant information or scientific uncertainty pertaining to an agency's evaluation of significant adverse impacts on the human environment, an agency must make clear that such information is lacking or that the uncertainty exists. An agency must include a worst case analysis of the potential impacts of the proposal and an indication of the probability or improbability of their

> occurrence if (a) the information relevant to adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining the information are exorbitant, or (b) the information relevant to adverse impacts is important to the decision and the means to obtain it are not known.
>
> NEPA requires that impact statements, at a minimum, contain information to alert the public and Congress to all known possible environmental consequences of agency action. Thus, one of the federal government's most important obligations is to present to the fullest extent possible the spectrum of consequences that may result from agency decisions, and the details of their potential consequences for the human environment. (Federal Register, March 23, 1981, p. 18032)

Section D.4 addresses potential impacts of the proposed action on traditional Navajo values and lifestyles. In section D.5, potential impacts to the environment as a whole are discussed from the perspective of traditional Navajo values. Where potential impacts that are of unique concern to Navajos have been identified, findings have been conveyed to WCC technical staff, who will ensure that the findings are incorporated into the appropriate technical reports (e.g., Hydrology, Land Use Controls and Constraints). The findings related to social and economic conditions have been incorporated into this Technical Report, either in the main text or appendices.

ANTHROPOLOGICAL CONCEPTS

In order to understand Native American perceptions of and concerns about environmental changes that could result from the proposed NMGS project, it is necessary to have some appreciation of traditional cultures, history, and ongoing culture change. In some respects, traditional Native cultural values and worldviews were diametrically opposed to those of Euro-Americans with whom they came in contact. Partially as a result of culture contact, Native American cultures have undergone dramatic changes in the past several centuries, and particularly in the past few decades. Native and non-Native lifestyles, values, and worldviews appear to overlap now more than they ever have in the past. In spite of this apparent convergence of cultures, Native attitudes and behaviors continue to be influenced strongly by traditional values. The lack of understanding of fundamental differences between Native American and Euro-American traditional cultures often results in communication barriers and misunderstandings in multi-ethnic settings such as northwestern New Mexico.

The following concepts, which were developed by professional anthropologists, are presented as a framework for understanding complex multicultural situations as well as for appreciating the significant role played by culture in shaping peoples' perceptions, attitudes, and behaviors:

1) Culture shapes the way diffent individuals perceive or experience the same so-called "reality." Culture defines the range of behaviors considered appropriate in various situations by a group of people. Culture, moreover, is not necessarily "rational." That is, every culture contains inevitable paradoxes and contradictions as it continously evolves.

2) Cultural conditioning is primarily subconscious. Individuals are usually not aware of the way culture shapes their values and perceptions. They tend to think of their way of doing things as the natural or correct way. Members of one culture group will try to modify the behavior of members of another culture group, with the intention of enlightening them, and teaching them "proper" values. (The historical attempts to convert Native Americans to Christianity or to train them for 8-to-5 jobs are good examples of this.) It is often a surprise to the change agent to find that the recipients of this intended generosity resist change, because they

hold their own way of doing things to be not only correct, but superior.

3) Culture is dynamic, not stable. Every culture changes continuously, stimulated by both internal and external influences. A culture group is usually identified by a set of common, shared traits (beliefs, values, behaviors, rituals, material goods). This "culture core," however, evolves continuously so that the disappearance of one particular trait cannot be equated with the disappearance of the culture. For example, because a Navajo wears denim, drives a pickup truck, and works in a power plant does not mean he has abandoned his traditional culture, or that he views the world or environment in the same way as fellow (non-Native) workers. Cultures can continuously borrow and incorporate new elements while retaining a unique world view and a strong sense of cultural identity among its members.

4) Some aspects of culture are more resistant to change than others. Case studies of culture contact and acculturation indicate that some aspects of culture change more readily than others. Material aspects of culture, for example, usually change more readily than non-material aspects of culture. In culture contact situations, items such as tools and clothing may be adopted readily, but cultural values, behaviors, rituals, and institutions will be more resistant to change.

Because of the historical spread of "Western" technology and material goods, Euro-Americans today have difficulty appreciating the persistent influence of cultural conditioning in Native American cultures. They assume that the widespread use of non-traditional consumer goods among Native Americans represents abandonment of their traditional values and wholesale adoption of "modernization." The fact is that there are persistent, underlying differences in value orientations and behavior patterns between Natives and Euro-Americans. Explicit recognition of these differences will help non-Natives develop a better understanding of the potential impacts of the proposed NMGS project on affected Native Americans. Understanding present differences must be based on an appreciation of traditional Native American cultures and the direction and pace of recent changes.

D.2
TRADITIONAL NAVAJO VALUES AND LIFESTYLE --HISTORICAL PERSPECTIVE

The following pages present information about important aspects of the traditional Navajo culture. The term "traditional" is used here to refer to the culture as it existed during roughly the first half of the twentieth century. No culture is static, however, and like all others the Navajo culture has undergone continuous change over time.

Contact between Navajos and members of other culture groups has continued during this century, and the rate of culture change has been relatively rapid, as it has been for most Native American groups in the U.S. Rapid population growth, depletion of the renewable resource base, increasing energy resource exploration, and development on lands traditionally occupied or used by Navajos, and better access to educational and employment opportunities in non-Native settings have contributed to increased acculturation rates. It should be remembered that Navajos today represent a mosaic of values and lifestyles ranging from traditional to "modern" or highly acculturated due to the different levels of individuals' exposure to other culture groups as well as different individual responses to to acculturation influences. The historical perspective on traditional Navajo values and lifestyles is described in this section, and the next section describes a more contemporary view of traditional Navajo values and lifestyles.

The following sketch of traditional Navajo culture is based on a variety of sources, which are referred to throughout the text. The Cultural Resources Technical Report also contains an ethnographic overview of the affected region as well as references to sources for further information.

HISTORY

The Navajos are members of the Athabascan language group that migrated from Asia to the northwest Pacific coast of North America approximately thirteen to sixteen hundred years ago. Exactly when the Navajos arrived in the Southwest is a matter of debate. Some evidence suggests they may have traveled southward along the eastern slopes of the Rocky Mountains as early as AD 700 (Van Valkenberg 1974, Kelly 1968). It is generally accepted that the Navajos reached the Southwest before AD 1500. Originally hunters and gatherers, the Navajos were strongly influenced by the sedentary Puebloans and other groups they encountered in the Southwest, as well as by the Spaniards who moved north from Mexico in search of wealth.

The first mention of the Navajos in historical records was made in 1626 by the Spanish friar Geronimo Zarate Salmeron, who described them as agriculturists. In 1629, Fray Alonso de Benavides visited the area of the "Apache Indians of Nabahu" and subsequently made plans for the conversion of the tribe. Christian teachings failed to supplant the native religion, however, and the mission was abandoned after a year. Throughout the eighteenth century, attempts to convert the Navajos to Christianity continued, but met with little success.

Following the Pueblo revolt of 1680, many Puebloans fearing Spanish reprisals took refuge with the Navajos. How long the Navajos and Puebloans lived in close proximity is not certain, but evidence suggests that between 1680 and 1764 intensive acculturation or transculturation occurred (Shepardson 1963). Weaving, for example, became an important part of Navajo culture during this period. Many people of Puebloan descent chose to remain among the Navajos after the threat of reprisals subsided.

By the late seventeenth century, the Navajos were herding sheep. goats, and horses acquired from the Spanish. The acquisition of livestock produced widespread changes in the orientation of Navajo culture. Not only did it provide a more stable and larger food supply, but it also affected settlement pattern. Navajo family groups dispersed over a wide area in order to have sufficient access to grazing lands and watering places (Kimball and Provinse 1942). Increased mobility gave rise to more extensive raiding by the Navajos, who captured food, women, and horses from the surrounding Spanish settlers and Pueblo villagers. Some of these raids were also retaliatory.

During the latter part of the eighteenth century, relations between Native Americans in the Southwest and the Spanish government grew strained. Most of the reports written by Spanish and Mexican government officials describe skirmishes, Navajo raids, and Spanish reprisals and punitive campaigns (Kluckhohn and Leighton 1974). As Spain's control over its American colonies weakened, the Navajos increased their raiding and became one of the dominant military powers in the Southwest. In 1846, the United States took possession of the southwestern territories from Mexico through the Treaty of Guadalupe-Hidalgo. Unrest and depredations by the Navajos continued while attempts by the American military to bring stability to the area through negotiation ultimately failed.

Raids upon the Rio Grande settlements increased substantially during 1862 when the Navajos and Apaches took advantage of the army's preoccupation with the Civil War. In retaliation, the United States government ordered Colonel Kit Carson into the Navajo country in June 1863 with specific instructions to remove all the Navajos and Apaches to the Bosque Redondo (Fort Sumner) reservation in eastern New Mexico. The Indians were to be brought in peacefully if possible and forcefully if necessary. Where there was resistance, Navajos were killed and their crops and livestock were destroyed. The plan behind removal of the Navajos went far beyond a mere punitive campaign. It was an attempt by the military to establish peace by changing the Navajos' lifestyle permanently. It was believed that Indians gathered on a reservation could be taught Christianity as well as new habits, new ideas, and new economic pursuits. On March 6, 1864, 2400 Navajos began the 300-mile "Long Walk" to the Bosque Redondo on the banks of the Pecos River. Eventually, 8000 Navajos were placed in captivity at Fort Sumner.

The Fort Sumner experience had a devastating effect on Navajos and has left deep impressions that remain over a century later. "Aside from the reluctance of the dispirited and homesick Navajos to take up farming, drought, hail and worms attacked the crops" (Kelly 1968). The scheme was also considered a failure by the U.S. Government. The first twenty months of the experiment cost the War Department $1.114.981.70. and the average cost of rations between 1863 and 1868 was $750,000 per year (Kelly 1968). By 1868, the Fort Sumner experiment was officially abandoned and the Navajos were permitted to return to their former homeland located between the Four Sacred Mountains. A treaty was signed which designated almost 4 million acres of land for exclusive use by the Navajos. The government eventually issued seed, tools, and some livestock to aid the Navajos in rebuilding their homes and herds and in reestablishing fields and orchards.

Another major influence on Navajo culture and values that has been widely documented is the recruitment of Navajos for the armed services during World War II. The Navajos played an important role in the war by acting as communicators. The Navajo language formed the basis of a "code" that was never broken by the Japanese. As a result, Navajo veterans returned from war as heroes, although full recognition as such did not occur immediately. Nonetheless, national attention was drawn to the poor living conditions on the Reservation to which they returned. For the Navajo veterans, the war had brought exposure to a wide variety of new cultural values and lifestyles, as well as new skills.

HISTORICAL RELIGION AND WORLDVIEW

According to Kluckhohn and Leighton (1977), there was no word or phrase in the Navajo language that translates as "religion." Religion among the Navajo was not a separate entity; instead, it was intricately linked to all aspects of Navajo life. To an outsider, Navajo ceremonies may have been viewed as primarily "religious" rituals, but they also served as techniques for securing food, restoring health, and ensuring survival.

The universe of the Navajo contained two categories of beings: the supernatural Holy People and humans or Earth Surface People, both living and dead. Included among the Holy People were such famous mythological figures as Changing Woman, Sun, and the Twin War Gods. Only Changing Woman was consistently helpful to man. All other deities are capable of both good and evil (Spencer 1957). Lesser deities represented forces found in nature (e.g., wind, thunder, and lightning), while still others were believed to be the ancestors of animals and plants or figures identified with specific geographic locations.

According to the Navajo origin myth, the universe was created by First Man, a deity transformed from an ear of corn. The First People or Holy People inhabited four previous worlds, all located underground, before they finally ascended to this world by making their way through a hollow reed. The actual Place of Emergence was believed to be located in the mountains of southeastern Colorado (Reichard 1945).

The Navajo believed that the universe worked according to set rules. If humans could discover those rules and follow them, they would remain safe or be restored to safety (Kluckhohn and Leighton 1967). This balance was believed to be precarious and could be upset either intentionally, by ghosts or witches, or unintentionally, by persons who carelessly failed to observe the rules. Illness, both physical and mental, was believed to result when the universal harmony was upset. Restoration to health was viewed as part of the process of righting the harmonic balance of natural forces, so universal unity was ultimately dependent on the well-being of the individual. Over time, the Navajos developed a wide range of ceremonies and rituals aimed at restoring or preserving balance and harmony to universal forces.

Important parts of traditional Navajo culture included the singing of solemn chants and the performance of sacred dramas by masked impersonators of the Holy People. These chants, or Ways, which probably numbered over 50, were based on Navajo mythology. They consisted of complicated ceremonies lasting from one to nine nights, and included the use of chants, songs, prayers, dances, prayer sticks, herbs, emetics, sweat baths, and sandpaintings (Reichard 1945).

Navajo chantways were divided into three groups: holyway, evilway. and lifeway, on the basis of mythological association, common rituals, and the factors against which the cure was directed (Kluckhohn and Leighton, 1979). Holy Way chants were used when illness could be traced to offenses against various supernatural and Holy People, such as lightning, thunder, winds, snakes, and other animals. Two examples of Holyway chants are the Shooting Chant, which was used against disease attributable to lightning or snakes and the Mountain Way, which was used to alleviate nervousness caused from contact with bears. The Lifeway chants were employed in cases of bodily injury. Evilway chants were used for curing sickness caused by ghosts (Spencer 1957) or contact with different people or strangers, who were generally regarded as harmful.

Myths and rituals were an important part of Navajo daily life. They provided systematic protection against supernatural dangers, the threat of ill health, dangers in the physical environment, antisocial tensions, and the pressures of a more powerful society (Kluckhohn and Leighton 1979). Performance of the rites heightened awareness of the Navajos' common beliefs, common goals, and commonly shared value system. Preparing for and carrying out a rite necessitated cooperation and thus reinforced the Navajos' sense of mutual dependency and support (Kluckhohn and Leighton 1979).

HISTORICAL SOCIAL ORGANIZATION

Traditional Navajo social organization was informal, with no simple pattern to define the size or composition of basic social groups. Most ethnographers agree that traditional Navajo society consisted of a variety of social units including households, extended family groups, and larger cooperating groups. Descent was traced through matrilineal clans.

The basic unit of economic and social cooperation was the nuclear family, that is, a family consisting of husband, wife, and unmarried children. Descent was traced through the mother, and generally newly married couples lived with the wife's family. Property was usually inherited through the female line. The nuclear family was often synonymous with a single hogan unit of household, but sometimes the household would also contain other relatives who were unmarried or widowed (Shepardson 1963). New hogans would be built in traditional areas to accommodate growing families.

Marriage established relationships between two families and resulted in the creation of a new social unit. Typically, an extended family group included an older woman with her husband and unmarried children, and married daughters with their husbands and children (Kluckhohn and Leighton 1974). Tasks such as house building, cultivation, and stock raising were carried out in a cooperative manner by members of the extended family, and resources were shared. "With this pattern of sharing individual fortunes, the extended family enjoys a built-in mechanism for economic flexibility for itself" (Griffith 1980).

The extended family residence group usually consisted of several nuclear families, each in its own hogan. These hogans of a residence group were usually within "shouting distance" of each other (Kluckhohn and Leighton 1974). Members of the residence group cooperated in such matters as herding sheep, cultivating fields, hauling wood and water, and providing transportation. The residence unit was considered to be the most important functional unit in Navajo social organization (Witherspoon 1975).

A Navajo's "relatives" included more than the members of his biological and extended families and affinal kin. The outfit and clan were important extensions of the circle of relations. The "outfit" were a group of relatives (usually consisting of two or more extended families) who worked together in such economic enterprises as planting and harvesting. They also cooperated in the sponsorship of major ceremonials. The families in an outfit could be scattered over many square miles. If the members of the outfit lived on lands having unbroken continuity. then the unit was referred to as a land use community, which might occupy from 12,000 to 20,000 acres and include from 50 to 200 persons (Kluckhohn and Leighton 1974). It was usually through the cooperative efforts of the land use community that major works such as dams and canal systems for farming were constructed.

One of the most important ties that bound family to family in traditional Navajo society was the clan. The Navajos were divided into more than 60 clans, with each person belonging to the clan of his or her mother and "born for" the clan of his or her father (Kluckhohn and Leighton 1974). The origin of many of these clans is described in Navajo mythology. The clan had no formal head, was not organized, did not congregate, and did not hold property in common. The functions of the clan included prohibiting marriage or sexual relations between members (i.e., marriage within the clan of either the mother or father is forbidden) and providing hospitality and mutual assistance. A traveler, for example, would attempt to locate members of his own clan who could be expected to feed, shelter, and otherwise assist him (Aberle 1961). The clan was (and still is) an important agent for social control. All clansmen were responsible for the crimes and debts of other members of their clan; hence, it was in their own interest to prevent murder. rape, theft or other crimes committed by clan relatives (Kluckhohn and Leighton 1974).

Navajos referred to themselves as Dine, or "the people" as distinct from all others. The cohesiveness that occurs in a national sense is due to the common linguistic and cultural heritage and to the occupation of a defined geographical territory (Hill 1940). As previously mentioned, Navajos traditionally pooled labor in herding and other productive activities. Relationships were generally noncompetitive and accumulation of wealth by individuals within the family group was socially unacceptable. Instead, values were placed on mutual sharing and reciprocity. An individual who had accumulated wealth was generally subject to accusations of witchcraft and application of social pressure to distribute his wealth to less fortunate relatives.

HISTORICAL POLITICAL ORGANIZATION

Until modern times, the Navajos had no tribal-wide political organization. Traditionally, decision-making occurred at the extended family level. Control of individual action generally rested in the Navajos as a group and not in any authoritative individual or body. Authority extended only indefinitely and transitorily beyond the established rules of behavior between sex groups, age groups, and classes of relatives. By 1846-64, however, political organization among the Navajos had developed to the point where local groups were organized under the leadership of a headman (natani), who was assisted by one or more war leaders. These headmen had no coercive power and their efficacy and tenure depended entirely upon their personal qualities and practical abilities. The local community headmen, or peace "natani," were appointed for life. These leaders were generally chosen for their character, oratorical ability, personal magnetism, and proven ability to serve in both the practical and religious aspects of the culture. Their responsibilities involved the direction of economic and domestic affairs, such as setting the time for planting and supervising the planting, cultivation, and harvesting of crops. They were also expected to look after the interests of the needy who were without close relatives. In addition to the local headman, some community leadership was vested in war leaders ("natini") who were responsible for defense operations if the need arose (Hill 1960).

In 1868. after the Navajos signed a peace treaty with the United States government and regained some of their land base, an Indian Agent was assigned to Fort Defiance to supervise the 9500 Navajos in the area. To help him carry out his responsibility, the agent officially recognized Barboncito as the Chief of the Navajo Tribe and held him responsible for his people. In addition, subchiefs were appointed by the Indian Agent on a regional basis (Williams 1970). Throughout the twentieth century, many of the changes in Navajo political organization can be interpreted as responses to U.S. government activities and programs.

In the early 1920s, spurred by the discovery of oil and gas resources near Shiprock, the U.S. Government created a council composed of several prominent tribal leaders to represent the tribe in approving mineral leases. The group functioned solely to interpret policy decisions previously arrived at and possessed no official power to influence decisions on leasing (Johnson 1966).

The first Navajo tribal council was elected in 1923. The purpose of this Council was to act as a forum to assist the U.S. Commissioner to the Navajo Tribe in managing the affairs of the Navajo people. The Council consisted of the following elected officials: a chairman, vice chairman, and one delegate and one alternate delegate from each of the six superintendencies within Navajo country (Williams 1970). The function of the Tribal Council was to make policy decisions for the tribe. However, because the U.S. Secretary of the Interior had ultimate authority to approve or veto any of the Council's decisions, the Council's power was greatly limited.

> The Secretary of the Interior had the right to remove any council delegate and was able to determine when a council was to meet by acting through his subordinate, the Commissioner. In addition, the council was not allowed to conduct any meetings unless the Commissioner was present (Williams 1970:21).

In 1934, the Indian Reorganization Act (IRA) was passed. As a stipulation of this act, a central Navajo administration was established at Window Rock. Two years later, efforts were made toward the development of a new Tribal Council. The reservation was canvassed for the purpose of identifying Navajo leadership; seventy individuals were subsequently selected to serve as members of the first Constitutional Assembly. The newly created Tribal Council immediately proceeded to draft a constitution and bylaws for the Tribe and submitted it to the secretary of the Interior for approval. In 1938 this draft constitution was rejected and a different set of bylaws or rules was issued as a replacement by the Secretary. These rules served as guidelines for the election and reorganization of the Navajo Tribal Council (Johnson 1966).

Under the 1938 Rules for the Tribal Council, the membership of the Council was enlarged to a total of 74 delegates, and Council meetings no longer had to be held in the presence of a government official. Since 1938. few major modifications of the original rules have been made. One of these modifications (made in 1957) provided for the transfer of all responsibility for the conduct of tribal elections from the Bureau of Indian Affairs to the Tribe itself. This was a significant step in the gradual transfer of administrative authority from the Bureau to the Tribe.

Since 1938, the Navajo Tribal Council has created a number of standing committees. These committees assist the Council by conducting studies and investigations in special areas such as finance, health, and education. Along with these committees, the growing volume of tribal business has necessitated the creation of a bureaucracy to administer the directives emanating from the Tribal Council. Navajo Tribal government agencies, located at Window Rock, Arizona, are structured after the Bureau of Indian Affairs model.

HISTORICAL ECONOMY

When the Navajos first migrated to the area that is now the U.S. Southwest, their economy was based on hunting and gathering. The Navajos, however, were strongly influenced by the sedentary Puebloans, from whom they learned to cultivate corn, beans, and squash as well as to weave.

During the Spanish-Mexican Period (1626-1846) agriculture was the basic Navajo economic pursuit, but sheep, goats, horses, and cattle had also been obtained from Europeans and Puebloans by trade and by raid. The introduction of domestic livestock animals revolutionized the Navajo economy by providing a steady source of salable or exchangeable wealth (wool and mohair, hides, and woolen textiles). This facilitated the acquisition of metal tools and other manufactured articles. As trade was gradually extended, Navajo demand for nontraditional goods increased. Livestock provided the basis for a transition from a subsistence economy to a wage-based economy in the 1900s, with concomitant changes in social and political organization, values, and lifestyles.

Once the Navajos were reestablished in their traditional lands (after their return from Fort Sumner in 1868), a period of relative prosperity and rapid population growth followed as pastoralism recovered and flourished. However, as the population increased and the land base remained constant, the area became subject to overgrazing which resulted in decreased carrying capacities. Despite a livestock reduction program sponsored by the federal government in the 1930s, there was no longer sufficient land to adequately support a traditional economy based principally on grazing. Thus, increased population in combination with the depletion of Reservation land led to an increasing dependence upon wage work by the Navajos. Unskilled seasonal wage labor with railroad and other migratory labor crews both on and off the Reservation became fundamental to maintaining Navajo families on the reservation. By the mid-1900s, the importance of wage work had increased dramatically. For example, in 1940, 58 percent of the Navajos' total income was derived from a combination of agriculture and livestock; by 1958, however, only 9.9 percent of the total income was derived from this source. Navajo handicraft entrepreneurship was one of the earliest business efforts in a money economy. For years, many Navajo families manufactured jewelry and rugs and sold their products for profit in small stores or roadside stands and/or traveled widely to sell at fairs, rodeos, pow-wows, and exhibitions (Kluckhohn 1974).

D.3

TRADITIONAL NAVAJO VALUES AND LIFESTYLES --CURRENT PERSPECTIVE

The information presented in the previous section provides a historical context for understanding "traditional" aspects of Navajo lifestyles and values that are still operational in the 1980s. Obviously, many aspects of Navajo culture have changed since the early 1900s. Material aspects of culture, in particular, have changed. Navajos have adopted readily to material goods introduced by Euro-Americans in the affected region. A modern Navajo may drive a pickup truck and use a variety of appliances that were not formerly a part of the Navajo culture. This does not necessarily mean, however, that fundamental values or worldview are radically different from those described in section D.2.

As discussed in the Cultural Resources Technical Report, there are certain elements of the Navajo culture that have persisted for seven or eight centuries:

> Some prime elements that compose the culture core of the Navajos are the clan system, matrilineal descent, matrilocal residence patterns, the "outfit" social mechanism, and Navajo religion, which in theory pervades all aspects of Navajo life and thought. (QRC 1982: A-15)

Navajo culture has displayed a remarkable ability to adapt to outside forces while preserving the integrity of that culture core (QRC 1982; George 1980).

The following paragraphs describe some of the key changes in Navajo religion and worldview, social organization, political organization, and economy that have taken place over the past few decades. This information is meant to depict the culture context of a "traditional" Navajo in the 1980s.

CURRENT RELIGION AND WORLDVIEW

Navajo religion and worldview have undergone changes as a result of acculturation and other factors, yet many traditional beliefs and values persist to this day. In the affected environment it is probable that there are Navajos who still adhere to ideas very similar to those described in Section 2.0. In addition, behavior of many Navajos who are apparently highly acculturated reflects adherence to some traditional beliefs and values. A "non-traditional" Navajo, for example, may commonly support sings or rituals, share wealth with extended family or clan members, or periodically return "home" to relatives for self-renewing rites, or to visit.

It is virtually impossible to determine the extent to which traditional beliefs and values persist among the Navajos from empirical evidence. A survey of religious affiliations conducted by the Shiprock Research Center in 1975 indicated that approximately 50 percent of the Navajos interviewed were affiliated with one of a variety of organized religions, including Protestant, Native American Church, Fundamentalist, Catholic, and Latter-Day Saints (Mormon). The remaining 50 percent responded that they were traditional Navajos, or claimed numerous religious affiliations, usually in addition to the traditional religion. Survey results can be misleading because even those Navajos who claim affiliation with a non-traditional church can still be greatly influenced by traditional beliefs and values. Whatever their professed religious affiliation, many modern Navajos are motivated by a worldview that anchors them within a rich cultural tradition which emphasizes cooperation, harmony or unity, and an orientation to the extended family rather than to the individual.

CURRENT SOCIAL ORGANIZATION

Navajos today feel primary responsibility to the nuclear family, but also continue to feel secondary responsibility to other relatives. The clan continues to be an important unit of social organization. Clan exogamy is still widely observed in the selection of marriage partners. Furthermore. members of the same matrilineal clans cooperate by providing mutual assistance in labor, materials, emotional support, or cash.

Mobility has resulted in the wider dispersion of family and clan members. While recognition of family and clan obligations is still strong among Navajos, the sense of neighborliness among new residents of the more urban centers is not so strong. Navajos who move to cities like Farmington or Gallup tend to maintain their ties with their "home" community rather than develop new cooperative relationships with their neighbors (PNM 1978). In order words, Navajos still define their sense of community and membership more on the basis of kinship networks than on place of residence. Those who leave the Reservation do not lose their sense of membership--first to their family, then to their clan, and today even to the wider society of the Navajo Nation (Boggs and Owens 1980).

Most Navajos who leave the Reservation or the community where they were raised do so with the intention of returning "home" periodically. A typical Navajo extended family today may include an elderly couple who care for a sheep herd on or near the Reservation, and their children who are away working in urban centers. The children and their families are likely to return to the family home for weekends and holidays. They might fill their trucks with packaged foods and hardware, and drive home to enjoy a feast of mutton prepared by the older folks. Often the sheep herds seen on the Reservation contain animals earmarked for individual relatives who are living and working elsewhere. Thus it can be observed that for many Navajos living an apparently non-traditional lifestyle, the more traditional lifestyle maintained by some kin or clan members continues to contribute an extremely important part of their own lives. The modern traditional Navajo, then, is one whose sense of home is centered around the traditional pursuits of some extended family members. Even if such an individual leaves the Reservation to obtain wage work, he or she remains an integral part of the traditional cooperative unit, providing cash and goods to those who raise sheep or sponsor sings and other traditional ceremonies. This type of flexibility and reciprocity has helped the Navajos survive changes in their resource base and adapt to fluctuating economic opportunities (PNM 1978).

CURRENT POLITICAL ORGANIZATION

Navajo political organization has undergone radical changes since traditional times. From a loosely organized political unit, the Navajo Tribe has developed into a hierarchical organization with highly specialized bureaucratic functions to handle the growing volume of tribal business and necessary interactions with external forces such as state and federal government agencies, and private and industrial groups.

The titular head of the Navajo Tribe's administrative unit is the chairman of the Navajo Tribal Council. This person is assisted by the Vice Chairman in the management of tribal affairs. Tribal programs are directed through eleven divisions: Administration and Finance, Legal Services, Public Safety and Resources, Community Development, Economic Development, Health Improvement Services, Social Welfare, Labor, Education, and Division of Chapter Development (see Map D-1). Under these divisions are a number of special-function departments and offices, many of which have been created since 1960. Examples of these are the Division of Administration and Finance, which facilitates and assists elected officials in executing financial policy through information gathering and policy analysis; the Navajo Environmental Protection Commission (EPC), patterned after the U.S. Environmental Protection Agency, and the Office of Navajo Labor Relations (ONLR), similar to the U.S. National Labor Relations Board (NLRB). Within each division is a planning department, office, or unit which is responsible for research and drafting plans to deal with problems of the division programs. Certain tribal programs or projects are coordinated by these planning entities.

Another important recent development in Navajo political organization has been the establishment of local planning boards at the chapter level. Officers to the Chapters are elected by ballot vote every four years. The chapter or local organization was originally established as a center for community discussion and the organization of cooperative labor. By the 1950s, approximately 80 chapters were active. Ten years later, the number of active chapters had grown to nearly 100 (Shepardson 1963). Since the 1978 reapportionment the number of delegates has increased to 87, representing 109 chapters (Rodgers 1981). The chapters serve as the base of and are an integral part of the Council System. They have been entrusted with important functions such as handling labor and special local works projects for the Council, conducting elections, administering local government matters, and various social activities. Chapter officials act as the principal communication link between the Tribal Council and Navajo communities. Decisions are made by majority rule and are enforced through the Council and its courts. As a result, today there is often conflict between the Tribe and those Chapters that reflect minority viewpoints.

In addition to the chapters, local grazing committees serve an important function at the local level. These committees, which have been a part of the Council System since 1948, locally administer and enforce the grazing regulations adopted by the Tribal Council and approved by the Secretary of the Interior. In addition to the duties and responsibilities connected with livestock, the grazing committees review and recommend land use permits for irrigation projects involving small-acreage farms.

There are currently 66 grazing committee members who are elected for terms of 4 years each by majority vote. The election of grazing committee representatives takes place concurrently with the general election of delegates and officers to the Navajo Tribal Council. The men and women elected to serve on the grazing committees are oriented toward retaining stock raising as the basis of their economy (Williams 1970) and are generally opposed to large-scale development that would affect land use for grazing purposes.

The past decade has brought increasing pressure to develop energy resources on and around the Navajo Reservation. As part of an effort to manage such development, the Navajo Tribe has joined forces with other Native American groups to form even larger political organizations. The Council of Energy Resource Tribes (CERT), formed in 1977 to help tribes negotiate a fair share of energy development profits, is chaired by Peter MacDonald, the Chairman of the Navajo Tribe. CERT now represents 25 tribes. There is also growing interest on the part of individuals and groups of Navajos in starting businesses related to energy development.

CURRENT ECONOMY

A wide range of economic alternatives to traditional subsistence activities has been developed through the tribe and through off-reservation public and private sector money. Table D-1 provides a breakdown by industrial sector of major employers located within the Navajo Nation in 1980. (Many of the sources for information on Navajo economy and employment do not specify whether the statistics refer to all tribal members, Reservation residents only, or the Eastern Navajo Agency.) Those employing 300 or more Navajos include: Navajo Agricultural Products Industry (agriculture); Utah International, Peabody, and Kerr-McGee Corporation (mining); Navajo Engineering & Construction Authority (construction); Navajo Forest Products Industries (manufacturing); Navajo Tribal Utility Authority, Arizona Public Service Company, and Atchison-Topeka and Santa Fe Railroad (transportation/communications/utilities); Indian Health Service, Office of Navajo Economic Opportunity (ONEO), Public Schools, and Bureau of Indian Affairs Schools (services); and Navajo Tribe, CETA, and Bureau of Indian Affairs (government).

As shown in Table D-2, employment opportunities within the Navajo Nation have increased significantly during the last decade, rising from an estimated 12,600 jobs in 1969 (not including the Eastern Navajo Agency) to a total of approximately 37,310 in 1980. The largest absolute increases occurred in the government, services, transportation/communications/utilities (TCU), and mining sectors. The rise in government jobs was in response to population growth and the resulting need for government services, the increased role of Navajos in tribal government, and the large number of Navajos participating in federally funded CETA programs. (Total employment in the government sector decreased dramatically between April 1980 and April 1981 due primarily to cuts in federal government spending. It

Table D-1. NAVAJO EMPLOYMENT IN MAJOR NAVAJO NATION ACTIVITIES: 1980

Entity	Number of Navajos
AGRICULTURE	
Navajo Agricultural Products Industry	304
Cameron Farming Project	30
Total Agricultural Employment	334
MINING	
Coal & Uranium Operations:	
Utah International	476
Peabody - Black Mesa Mine	313
Peabody - Kayenta Mine	447
Pittsburg & Midway Coal Co.	259
Kerr-McGee Corporation	371
United Nuclear	122
Phillips Uranium Corp.	21
Gulf Mineral Resources	78
Amcoal, Inc.	16
Ray Williams Mining	5
Conoco Uranium	4
Mobil	19
Western Nuclear	33
Consolidated Coal Co.	17
Superior Oil Company	55
Texaco	19
Southland Royalty	5
Phillips Petroleum	10
Kerr-McGee (oil)	6
R-R/NL Well Services	2
Navajo Oil Field Service	11
Explorations Operations:	
Conoco	41
Mobil	25
Exxon	1
Phillips Uranium Corp.	12
Challenger Drilling Co.	5
Total Mining Employment	2,373
CONSTRUCTION	
Navajo Engineering & Construction Authority	402
American Indian Engineering	17
Chuska Development Corp./MK	87
Chris Evans, Inc.	12
J.D. Dutton	21
Kealy Construction	4
Neilsen, Inc.	45
Peter Kiowits & Sons	10
American Mine Services, Inc.	3
Harrison Western	8
Sundt	114
ABCO Const. Co.	2
Agee Const. Co.	26
Mod Homes LTD	13
Beagles Const.	12
Bradbury & Stamm	37
Gardner Zembke	6
Musser Const.	1
TGK & McCarthy Const.	1
Carpenter Development	2
CDK	3
Burnett Const.	72
Granite Const.	10
Universal Const.	5
Cron Const. Co.	21
D.C. Speer Const.	19
Kent Nowlin Const.	26
Armstrong & Armstrong	10
Neilsons Const.	3
Lee Long Contracting	4
Flint Engineering & Const. Co.	9
Blair Electrical Const. Co.	1
Total Construction Employment	1,006
MANUFACTURING	
General Dynamics	82
Utah Navajo Industries	47
Navajo Forest Products Industries	415
Navajo Times	15
Navajo Optics	16
Shandiin Systems	7
Total Manufacturing Employment	582
TRANSPORTATION/COMMUNICATIONS/UTILITIES (TCU)	
Navajo Tribal Utility Authority	325
Navajo Communications Company	154
El Paso Natural Gas Company	120

Table D-1. NAVAJO EMPLOYMENT IN MAJOR NAVAJO NATION ACTIVITIES: 1980 (concluded)

Entity	Number of Navajos	Entity	Number of Navajos
Black Mesa Pipeline	31	SERVICES	
Arizona Public Service Co.	457		
Navajo Generating Station	285	Thunderbird Lodge	35
San Juan Power Plant*	166	Canyon De Chelly Motel	7
Cholla Power Plant*	61	Wetherill Inn	9
Coronado Power Plant*	32	Holiday Inn	52
Atchinson, Topeka, Santa Fe RR*	500	Goulding's TP & Lodging	39
Four Corners Pipeline	3	WR Motor Inn	53
Texas-New Mexico Pipeline Co.	3	Canyon De Chelly Nat. Pk.	12
Hay Hot Oil	5	Indian Health Service	1,373
Total TCU Employment	2,142	Navajo Health Authority	128
WHOLESALE & RETAIL TRADE		Sage Memorial Hosp. & Navajo Nation Health Foundation	84
		Navajo Nation Family Planning	16
Fed Mart Complex	75	DNA Legal Services, Inc.	68
Imperial Mart	19	Other Legal Services Combined	31
Navajo Arts & Crafts	10	ONEO	1,159
Griswold's, Inc.	17	Utah Navajo Development Council	38
Navajo Westerners	25	Dineh Cooperatives, Inc.	8
Navajo Wool and Mohair Marketing Industries	11	Navajo Business Dev. Corp.	3
		Navajo Community College	291
Black Mesa Shopping Center	27	College of Ganado	41
Al's Market & Lumber	22	A School For Me, Inc.	87
Davis Chevrolet, Inc.	4	St. Michaels Special Education	82
Navajo Trail Shopping Center	21	Rough Rock Demonstration School	147
Window Rock Mall	18	Rock Point Community School	128
Total Wholesale & Retail Trade Employment	249	Borrego Pass Community School	31
		Ramah Navajo School	261
		Shiprock Alternative School	22
FINANCE/INSURANCE/REAL ESTATE		Mission Schools	34
		Public Schools	1,659
Navajo Housing Authority	118	Federal-BIA Schools	2,363
Denay Insurance	2	Total Service Employment	8,261
Great Western Bank	12		
First State Bank	0	GOVERNMENT	
First National Bank	12		
Merchants Bank*	2	Navajo Tribe	2,905
Navajoland Credit Union	4	CETA	6,687
Total Finance/Insurance/Real Estate Employment	150	Bureau of Indian Affairs	2,113
		Total Government Employment	11,705
		TOTAL EMPLOYMENT	26,802

Source: The Navajo Tribe, 1980 Navajo National Overall Economic Development Program, p. 22-25.

The asterisks (*) indicate those organizations close to the Reservation border, which have a significant impact on the Navajo economy.

Table D-2. COMPARISON OF NAVAJO NATION TOTAL WAGE EMPLOYMENT BY INDUSTRIAL SECTOR: 1969, 1975, and 1980

Industrial Sector	1969[a]	Percent	1975	Percent	1980[b]	Percent
Agriculture	0	0.0	177	0.7	341	0.9
Mining	289	2.3	1,607	6.5	4,065	10.9
Construction	23	0.2	3,416	13.9	1,883	5.0
Manufacturing	2,061	16.3	1,022	4.2	612	1.6
Transportation/Communications/ Utilities	442	3.5	1,699	6.9	5,961	16.0
Wholesale/Retail	605	4.8	1,758	7.1	313	0.8
Finance/Insurance/Real Estate	49	0.4	127	0.5	179	0.5
Services	4,739	37.5	9,955	40.5	11,812	31.7
Government	4,423	35.0	4,848	19.7	12,144	32.5
TOTAL	12,631	100.0	24,609	100.0	37,310	99.9
NAVAJO	8,409		17,655		26,802	
NON-NAVAJO	4,222		6,954		10,508	
TOTAL NAVAJO WAGE EMPLOYMENT:	66.6%		71.7%		71.8%	

[a] Data for the Eastern Navajo Agency were not included.

[b] Compiled by the Division of Economic Development and the Office of Navajo Labor Relations: April 1980.

Source: The Navajo Tribe, 1980 Navajo Nation Overall Economic Development Program, p. 25; Thomas Glenn, The Structure of Employment in the Navajo Nation (Window Rock, Arizona: Navajo Nation, 1976), p. 6.

was estimated that by April 1981, employment in the government sector had dropped by approximately 5425 jobs, which represented a reduction of almost 50 percent. Approximately 5100 of those jobs were CETA funded [The Navajo Tribe 1981:7.].) The increased number of TCU sector jobs resulted from the rise in housing construction and related infrastructure development and increased employment at the Navajo Generating Station and Four Corners Power Plant. Changes in the services sector were attributed to increases in school, health, and social services programs, while the increased number of jobs in the mining sector reflected a rise in energy exploration and development. Manufacturing and wholesale and retail trade registered the most significant decreases in total employment between 1969 and 1980. The loss of Fairchild Semiconductor, Inc. in 1974 (which employed 950 persons) and the absence of any new major industries locating on the Reservation accounted for the downward trend in the manufacturing sector, while major constraints such as the lack of business financing, difficulties in obtaining business site leases and mortgage leases involving trust land, and a lack of expertise and experience in operating small businesses inhibited growth in the wholesale and retail trade sectors (The Navajo Tribe 1976:6 and 1979:16-18).

The number and proportion of Navajos employed in jobs in the Navajo Nation also increased between 1969 and 1980 (as illustrated in Table D-2), rising from 66.6 percent to 71.8 percent, respectively. Table D-3 shows that the largest gains for Navajos were in government, services, TCU, and mining, while increases for non-Navajos occurred principally in TCU and mining.

While the number of job opportunities for Navajos has increased over time, employment and income levels for the Navajo Nation continue to be well below comparable U.S. statistics. Minimum rates of unemployment for the tribe during the 1970s were estimated at 30

Table D-3. CHANGES IN NAVAJO AND NON-NAVAJO EMPLOYMENT BY INDUSTRIAL SECTORS: 1975 AND 1980

Industrial Sector	Navajo		Non-Navajo		Total		% Navajo	
	1975	1980	1975	1980	1975	1980	1975	1980
Agriculture	161	334	16	7	177	341	91.0	97.9
Mining	960	2,356	647	1,689	1,607	4,065	59.7	58.0
Construction	1,983	1,006	1,433	877	3,416	1,883	58.1	53.4
Manufacturing	970	582	52	30	1,022	612	94.9	95.1
Transportation, Communication, Utilities	947	2,142	752	3,819	1,699	5,961	55.7	35.9
Wholesale and Retail Trade	1,262	249	496	64	1,758	313	71.8	79.6
Fire, Insurance and Real Estate	94	150	33	29	127	179	74.0	83.8
Services	6,932	8,261	3,023	3,551	9,955	11,812	69.6	70.0
Government	4,346	11,705	502	439	4,848	12,144	89.6	96.4
Total	17,655	26,785	6,954	10,505	24,609	37,310	71.7	71.8

Source: The Navajo Tribe, _1980 Navajo Nation Overall Economic Development Program_, p. 21; Thomas Glenn, The Structure of Employment in the Navajo Nation (Window Rock, Arizona: Navajo Nation, 1976), p. 6.

percent and over. In 1980, the potential labor force (persons age 16 and over) comprised 50.4 percent (75,030) of the Navajo population. Of this number, an estimated 60.7 percent (45,521) were employed and 39.3 percent (29,509) were unemployed. Due to the significant loss of government sector jobs in late 1980 and early 1981, tribal officials projected that the unemployment rate would increase beyond 45 percent by the end of 1981 (The Navajo Nation 1980:7 and 1981:1). In contrast, the U.S. unemployment rates from 1970 through 1980 ranged from a low of 4.9 percent in 1970 to a high of 8.5 percent in 1975. The 11-year average was 6.3 percent (U.S. Department of Labor 1982).

Income data for the Navajos illustrate the significant disparity between income levels for the tribe and for the U.S. as a whole. In 1970, per capita income for the Navajo Nation was only $805 compared to $2,710 for the U.S.; median family income was $3,084 and $9,867, respectively. Tribal officials estimated the 1980 Navajo Nation per capita income at $1,037 (1970 dollars); thus the gap between the level of income for the Navajos and for the U.S. as a whole continued to widen (The Navajo Tribe 1974:4; 1979:5; and 1981:2; U.S. Bureau of the Census 1971).

Table D-4, listing the distribution of income for the Navajo Nation by household, shows that approximately 70 percent of the households earned a combined income of $5,500 or less, which placed them below the U.S. poverty level for that year (U.S. Department of Commerce 1975:1). Total Navajo income comprises two principal components: (1) personal income (wages and salaries in addition to proprietors' income from enterprises such as businesses, farms, livestock, arts, and crafts), and (2) transfer payments (federal, state, and tribal government earnings including social and veterans assistance). Historically, Navajos have related heavily on transfer payments as part of their total income. (See Table D-5 for a

Table D-4. DISTRIBUTION OF HOUSEHOLD INCOME FOR THE NAVAJO NATION: 1975

Income Groups	Percent of Total Income	Percent of Households
$ 0 - $ 1,000	0.6	4.9
$ 1,001 - $ 2,000	5.8	18.5
$ 2,001 - $ 3,000	9.7	18.8
$ 3,001 - $ 4,000	10.2	14.1
$ 4,001 - $ 5,000	9.7	10.6
$ 5,001 - $ 6,000	10.2	8.8
$ 6,001 - $ 7,000	5.7	4.3
$ 7,001 - $ 8,000	8.1	5.2
$ 8,001 - $ 9,000	5.2	3.4
$ 9,001 - $10,000	5.7	2.5
$10,001 - $11,000	3.4	1.6
$11,001 - $12,000	4.1	1.7
$12,001 - $13,000	2.1	0.8
$13,001 - $14,000	2.7	1.0
$14,001 - $15,000	2.9	1.0
$15,001 - $16,000	14.0	2.8

Source: The Navajo Tribe.

Table D-5. NAVAJO PERSONAL INCOME (FACTOR COST) BY INDUSTRIAL SECTOR: 1978

Industrial Sector	Amount	Percent of Total
Agriculture and Livestock	$ 6,746,907	2.0
Mining	91,540,000	26.8
Construction	3,906,000	1.1
Manufacturing	7,380,000	2.2
Transportation/Communications/ Utilities	20,939,182	6.1
Wholesale and Retail Trade	1,636,400	0.5
Finance/Insurance/Real Estate	585,000	0.2
Services	99,347,896	29.1
Government	109,963,858	32.2
	$341,746,243	100.2

Source: The Navajo Tribe, 1980 Navajo Nation Overall Economic Development Program, p. 4.

breakdown of Navajo personal income by industrial sector for 1978 and Table D-6 for a listing of 1978 transfer payments by source.) As shown in Tables D-5 and D-6, transfer payments accounted for approximately 20 percent of total Navajo income in 1978. Of the three major sources of transfer payments, the federal and state shares each totaled approximately 43 percent. In terms of personal income by industrial sector, approximately 88 percent of the total was represented by three sectors, i.e., government, services, and mining (The Navajo Tribe 1980:3-5). It should be kept in mind that many of the statistics on Navajo income may be misleading due to the nature of extended family and clan cooperation. Per capita income figures, however, should be interpreted in the context of extended family reciprocity, when wage-earners share cash with relatives engaged in subsistence activities in exchange for mutton and livestock, and when relatives pool their resources to supply transportation, accommodation, food and other to each other.

Table D-6. TRANSFER PAYMENTS: 1978

Source	Amount	Percent of Total
Navajo Tribe		
General Assistance	$10,909,604	13.0
Work Assistance	265,462	0.3
Miscellaneous	404,000	0.5
Federal		
Social Security	1,950,000	2.3
Railroad Retirement Benefit	643,500	0.8
Women, Infant, and Child Care	4,230,200	5.0
Donated Food	7,000,000	8.3
Veteran's Assistance	22,350,980	26.6
State		
Categorical and General Assistance	30,000,000	35.7
Unemployment Insurance	6,264,000	7.5
TOTAL	84,017,746	100.0

Source: The Navajo Tribe, 1980 Navajo Nation Economic Development Program, p. 5.

D.4

POTENTIAL PROJECT IMPACTS ON TRADITIONAL VALUES AND LIFESTYLES

The information presented in section D.3 indicates that many Navajos today hold traditional values to some degree even in the context of a nontraditional lifestyle. It is likely that, for such people, NMGS and similar projects would contribute to an acceleration of trends already observed in the affected environment: increasing mobility, increasing dependence on wage employment, geographical separation of family and clan members, experience of value conflicts, and stress associated with culture change influences.

Navajos who would benefit from NMGS-related employment are likely to be most receptive to the project. More traditional Navajos are likely to be less enthusiastic about it, particularly because of its potential impacts on sacred sites, plant and mineral collection areas, and grazing lands--as well as the associated influx of outsiders who may not respect or appreciate the traditional values and lifestyles of the Navajos.

Even the most traditional Navajos, however, would not view the proposed project as all bad. One of the major concerns of older, more traditional Navajos is that young Navajos are moving away when they grow up. While they might feel that energy resource development activities have had some devastating effects on land and lifeways in the affected environment, they also realize that this type of development results in jobs that permit younger people to stay closer to home, and come home more frequently. They benefit indirectly, too, as the family wage-earners are apt to share their cash and material goods with their relatives who continue to pursue more traditional lifestyles.

The key factor in determining whether project impacts would be perceived to be adverse or beneficial by Navajos is the extent to which Navajos would be employed directly or indirectly as a result of the project--thereby not only improving their income while allowing them to stay close to home, but also reducing the potential influx of outsiders who would increase the presence of different values and lifestyles in the region. The question of Navajo employment on the NMGS project is explored in the following pages.

The construction and operation of NMGS and its associated ancillary facilities would provide a significant addition to the economic base of northwestern New Mexico due to the sizable amount of project-related jobs, income, and tax revenues it would bring (see analysis in main text of this report). Because of (1) the proximity of the proposed plant site to the Navajo Reservation boundary, (2) the plant's location within the Eastern Navajo Agency (albeit not on Navajo-held land), and (3) the chronically high unemployment rate and low per capita income among Navajos, some members of the tribe have a high level of interest in potential NMGS-related employment. One perspective held by Navajos is that it is outsiders rather than themselves who reap the economic and financial benefits of this type of energy resource development.

The issue addressed in this section is the magnitude of the potential employment of Navajo workers in NMGS-related construction and operation jobs. The analysis focuses on an examination of employment patterns and their causal factors at existing major power plants on or near the Navajo Reservation, as well as on Navajo labor force characteristics. Information for this section was obtained from secondary source materials and through discussions with Public Service Company of New Mexico (PNM), Arizona Public Service Company (APS), and Salt River Project (SRP) personnel in addition to members of the Navajo Tribe and building and trades unions.

The construction and operation jobs associated with NMGS would not necessarily represent new or unique employment opportunities for Navajos since several large-scale coal-fired power plants have been built on or near the Reservation since the early 1960s. As shown in Table D-7, there are two operating power plants located on the Reservation (Navajo Generating Station and Four Corners Power Plant) and four located within 5 to 50 miles of the Reservation boundaries.

Table D-8 shows the number of Navajos and non-Navajos employed in the operation work force at the five operating power plants. The facilities with both the largest number and highest proportion of Navajos compared to the total work force are Navajo Generating Station and Four Corners Power Plant. Both of those facilities are located on the Reservation. In both cases, the participating utilities and the Navajo Tribe negotiated preferential hiring clauses as part of the lease agreement (Mondotte 1982; Hartsig 1982). (For example, the APS lease agreement states that "Lessees agree that in selecting applicants for employment on Reservation Lands in connection with the construction and operation of the Four Corners Project, they will employ Navajo Indians when available in all positions for which they are qualified in the judgment of the Lessees or their operating agent or contractors, and will pay prevailing wages to such Navajo employees" [APS Navajo Lease Agreement 1962:42].)

Table D-7. MAJOR POWER PLANTS LOCATED ON OR NEAR THE NAVAJO RESERVATION

Power Plant	County/State	On/Off Reser-vation	Company	Prefer-ential Hiring	Number of Units	Year Construction Began
Four Corners Power Plant	San Juan, NM	On	Arizona Public Service	Yes	5	1961
Navajo Generating Station	Coconino, AZ	On	Salt River Project	Yes	3	1969
San Juan Power Plant	San Juan, NM	Off (within 5 miles)	Public Service Company	No	4	1969
Cholla Power Plant	Navajo, AZ	Off (within 25 miles)	Arizona Public Service	No	4	1961
Coronado Power Plant	Apache, AZ	Off (within 50 miles)	Salt River Project	No	3	1972
Escalante Generating Station	McKinley, NM	Off (within 50 miles)	Plains Electric	No	1	1981

Sources: Penny Andersen, Placement Specialist, San Juan Power Plant, Public Service Company of New Mexico, 1982; Franklin Roberts, Public Relations Manager, San Juan Power Plant, Public Service Company of New Mexico, 1982; Noelle Mondotte, Administrator, Affirmative Action Division, Salt River Project, 1982; George Jett, Public Information Section, Salt River Project, 1982; Kit Owens, Public Relations Manager, Four Corners Power Plant, 1982; Michael K. Hartsig, Manager, Affirmative Action, Personnel Information Center, Arizona Public Service Company, 1982; Fred L. Nielsen, Resident Construction Manager, Burns & McDonnel, Escalante Generating Station, 1982.

Table D-8. NAVAJO AND NON-NAVAJO OPERATIONS WORK FORCE FOR MAJOR POWER PLANTS LOCATED ON OR NEAR THE NAVAJO RESERVATION

		1974	1975	1976	1977	1978	1979[c]	1980	1981	1982
Four Corners Power Plant	Navajo	113	137	152	264	317	407	457	545	NA
	Non-Navajo	192	213	242	303	335	359	350	348	NA
	Total	305	350	394	567	652	766	807	893	NA
	% Navajo	37.0	39.1	38.6	46.6	48.6	53.1	56.6	61.0	NA
Navajo Generating Station[a]	Navajo	85	138	212	230	239	262	285	NA	NA
	Non-Navajo	162	211	276	382	381	455	457	NA	NA
	Total	247	349	488	612	620	717	742	NA	NA
	% Navajo	34.4	39.5	43.4	37.6	38.5	36.5	38.4	NA	NA
San Juan Power Plant	Navajo	NA	NA	NA	NA	NA	42	49	NA	60
	Non-Navajo	NA	NA	NA	NA	NA	492	593	NA	772
	Total	NA	NA	NA	NA	NA	534	642	NA	832
	% Navajo	NA	NA	NA	NA	NA	7.9	7.6	NA	7.2
Cholla Power Plant[b]	Navajo	NA	NA	NA	NA	NA	116	61	NA	NA
	Non-Navajo	NA	NA	NA	NA	NA	833	538	NA	NA
	Total	NA	NA	NA	NA	NA	949	599	NA	NA
	% Navajo	NA	NA	NA	NA	NA	12.2	10.2	NA	NA
Coronado Power Plant	Navajo	NA	NA	NA	NA	NA	15	14	14	NA
	Non-Navajo	NA	NA	NA	NA	NA	451	458	447	NA
	Total	NA	NA	NA	NA	NA	466	472	461	NA
	% Navajo	NA	NA	NA	NA	NA	3.2	3.0	3.0	NA

[a] The proportion of Navajos to the total work force at Navajo Generating Station generally ranges between 35 and 38 percent. Higher percentages reflect the counting of temporary workers (Mondotte 1982).

[b] Data for the Cholla Power Plant represent all on-site workers (The Navajo Tribe 1979:7 and 1980:23).

[c] March 1980 data are used for Coronado Power Plant (Mondotte 1982).

Sources: The Navajo Tribe, The Navajo Nation Overall Economic Development Program, 1974 through 1981; Penny Andersen, Placement Specialist, San Juan Power Plant, Public Service Company of New Mexico, 1982; Noelle Mondotte, Administrator, Affirmative Action Division, Salt River Project, 1982; Michael K. Hartsig, Manager, Affirmative Action, Personnel Information Center, Arizona Public Service Company, 1982.

The number of Navajos employed in plant operations has risen over time as new units were completed and as existing plants such as Four Corners increased the proportion of Navajo employees relative to their total work force. (For example, the number of Navajo operation workers at the Four Corners and Navajo plants increased from 198 workers in 1974 to 742 workers in 1980, as shown in Table D-8. Nonetheless, while employment at the Four Corners and Navajo plants accounted for over 50 percent of the on-Reservation Navajo employment by industry in 1974 and 1980, those employed represented less than 3 percent of the total Reservation work force [The Navajo Nation 1974:23 and 1980:21].) In 1981, 61.0 percent of the work force at the Four Corners Power Plant were Navajo; 38.4 percent of the Navajo Generating Station work force were Navajo in 1980. In contrast, the proportion of Navajo employment at off-Reservation power plants has been 10 percent or less. In 1980, Navajo employment at the San Juan, Four Corners, Navajo, Cholla, and Coronado plants totaled 866 workers.

As in the power plant operation jobs described above, the largest proportion of Navajo construction workers were hired in jobs located on the Reservation. For example, Bechtel Power Corporation (in a major contract at Navajo Generating Station) employed between 180 and 410 Navajos in 1974 through 1977. This represented approximately 24 and 37 percent of the total construction work force. A local contractor at the Four Corners Power Plant employed between 10 and 20 percent Navajos on a small project in the early 1970s. In contrast, PNM personnel estimated that during the construction of San Juan Power Plant, Navajos accounted for only 2 to 5 percent of the total work force. APS personnel estimated the percentage of Navajo construction workers at the Cholla Plant at 10 to 12 percent. Moreover, at the Escalante Generating Station, Navajos represented only 5.7 percent of the total construction work force of 700 workers in March 1982 (Roberts 1982; The Navajo Tribe 1974-1978; Watson 1982; Hartsig 1982; Nielsen 1982).

The higher proportion of Navajos in construction activities located on the Reservation is apparently directly related to the previously referenced preferential hiring agreements mentioned above. In addition, beginning in 1973, on-Reservation construction activities were subject to the "Guidelines for the Establishment of Navajo Manpower Utilization Requirements in Construction Activity" adopted by the Office of Navajo Labor Relations. (The Navajo Tribe's Division of Labor, Office of Navajo Labor Relations [ONLR] was organized to administer the Tribe's employment programs and to advocate jobs for Navajos. The ONLR, funded primarily through CETA, enforced compliance with the 1973 Guidelines, provided job notices and referrals, and monitored mining companies and construction contractors to assure compliance [The Navajo Tribe October 1980:11].) These guidelines applied:

> to all bids let and to all construction contracts entered into between the Navajo Tribe and any person, corporation, partnership, sole proprietorship, governmental agency or any other organization, for the purpose which ultimately results in construction activity taking place within or near the Navajo Nation. (The Navajo Tribe October 1980:70)

These guidelines included procedures for establishing a specific minimum percentage of Navajo craftsmen to be employed on construction projects (The Navajo Tribe October 1980:71).

The preceding discussion highlights the differences in the proportion of Navajo workers at power plants on the Reservation with preferential hiring agreements and others without those agreements located outside the Reservation. However, it must also be recognized that the potential magnitude of Navajo employment at on-Reservation power plants has been primarily a function of the supply of qualified Navajo workers. Regardless of employment quotas, if the demand for a particular skill and experience cannot be met by qualified Navajos, then non-Navajos would be hired.

Historically, building and trades unions, tribal officials, and utility companies operating power plants have recognized the desirability and need for upgrading the skills of the Navajo labor force while trying to increase participation in the construction and operation of generating stations both on and near the Reservation. In 1975, the Navajo Construction Industry Manpower Program established a joint tribal/union training facility on the Reservation. Pre-apprenticeship training was provided in 24 crafts (many of which included skills that could be utilized in power plant construction and operation). In 1979, the Navajo Skills Center (funded by the Navajo Division of Labor with CETA Title 3 monies) was opened in Crownpoint. (The Navajo Construction Industry Manpower Program was incorporated into the Navajo Skills Center [Martin 1982].) The purpose of the center was to address the high unemployment rate within the Navajo Nation through the provision of vocational and technical training programs related to Navajo labor market needs. (The center is currently reestablishing its program and seeking new funding sources [following cuts in federal funds] in order to maintain the center's viability [Morgan 1982].) Included among the training programs were pre-apprenticeship classes for plasterers, ironworkers, pipefitters, heavy equipment operators, and electricians. In addition, training in construction skills were also available through 3- to 4-year union-sponsored apprenticeship programs located on-site during place construction. Persons enrolled in the programs received both on-the-job and classroom training. plus an hourly wage (Martin 1982; Morgan 1982).

Operation phase jobs provide better long-term employment opportunities for Navajo workers than construction jobs. However, the only significant training/apprenticeship programs for operation jobs are provided on-site by utility companies operating the generating stations. The programs for each utility (PNM, APS, and SRP) differ in terms of their type, number, size, and length as well as qualification criteria. Nonetheless, they represent an important mechanism in the local area for maintaining and increasing the number of Navajo operation workers and for enhancing their skill levels (Kindred 1982; Anderson 1982; Hartsig 1982).

In summary, the construction and operation of NMGS would represent additional (rather than new) employment opportunities for Navajo workers since large-scale power plants have been constructed on or near the Reservation beginning in the early 1960s. In addition, the number of Navajos employed in power plant construction and operation has increased over time as new facilities and additional units have been built and as Navajos have gained relevant work experience. Because NMGS is proposed to be off-Reservation, it would seem that the availability of qualified Navajo workers will be a critical factor in determining how many work there. The demand for qualified local power plant workers (which has exceeded supply historically as well as currently) would be increased significantly with NMGS. Thus, the number of Navajos employed at NMGS would depend principally on the opportunities for Navajos to receive training in power plant construction and operation-related skills.

D.5

TRADITIONAL NAVAJO PERSPECTIVE ON POTENTIAL NMGS ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

The information presented in Sections D.2 and D.3 on traditional Navajo culture and recent change emphasizes that Navajo traditionalists perceive and value some environmental resources differently than Euro-Americans. It follows that they may also perceive potential impacts from the proposed NMGS project differently. The purpose of this section is to discuss WCC resource specialists' preliminary impact findings concerning the environmental resources most important to Native Americans in the affected region, insofar as the interpretation of those findings might differ if viewed from a traditional Navajo perspective.

Through the scoping process, Native Americans who would be affected by the proposed action have had several opportunities to express their views and perceptions of potential project impacts formally. In January 1981, the Bureau of Land Management sponsored Scoping Meetings on their San Juan Basin Action Plan and the New Mexico Generating Station at four Navajo Chapter Houses: Crownpoint, Huerfano, Pueblo Pintado, and Lake Valley. A meeting was held with the Jicarilla Apache in February 1981 at Dulce. Meetings on alternative transmission routes were held with Zias and Lagunas in August 1981. Additional meetings and key informant interviews have been held to discuss Native American views on the San Juan Basin Action Plan, proposed land exchanges, wilderness areas, coal developments, and energy development in general. From these meetings, as well as from interviews with key informants living or working in the potentially affected areas, it is possible to identify some of the principal Native American issues and concerns regarding the proposed action:

- Confusion about land use controls and constraints, ownership, use rights, subsurface resource ownership, proposed land exchanges, and land use decision-making processes
- Implications of Navajo-Hopi Land Dispute
- Increasing presence of strangers in areas traditionally used by Native Americans
- Disruption to grazing
- Effects on water supply (including springs)
- Potential air pollution
- Visual impacts
- Disturbance to cultural resources
- Access to mineral and plant collection areas
- Protection of sacred areas
- Potential employment benefits

Detailed descriptions of the affected resources associated with some of these concerns are presented in other WCC technical reports, as indicated below:

Potential Impact/Concern	Relevant Technical Report
Land ownership and use rights	Land Use Controls and Constraints
Navajo-Hopi Land Dispute	Land Use Controls and Constraints
Disruption to grazing	Vegetation
Water supply	Hydrology; Water Quality
Air pollution; visibility	Air Quality; Visual Resources
Protection of cultural resources and sacred sites	Cultural Resources
Access to mineral and plant collection areas	Cultural Resources (see also Vegetation and Mineral Resources)

For a detailed description of the affected environment and potential environmental consequences for these resources, refer to the appropriate technical report listed above. Some of the concerns that have been expressed by Native Americans are identical to those expressed by non-Natives in the affected region. These include such issues as air quality effects. Some of the conerns expressed, however, have unique meaning to Native Americans because of traditional values and lifestyles. These are: land use controls and constraints, water resources, vegetation, minerals, and cultural resources. Each of these topics is discussed below with reference to potential impacts as these might be perceived by a traditional Navajo.

LAND USE CONTROLS AND CONSTRAINTS

Energy exploration and development activities are viewed with a great deal of ambivalence by some Navajos in the affected region.

Seismic testing, drilling and sampling, and mining are activities that run counter to traditional beliefs about living in harmony with nature and respecting the earth. To a very traditional Navajo these acts would appear to be a form of degradation of the natural world inspired mainly by the profit motive, which runs counter to traditional values placed on sharing and cooperation. To the more acculturated Navajos, many of whom have had experience as energy-related workers, these contradictions are overlooked, and energy development is welcomed because of the wage opportunities associated with it.

There is evidence that the Navajo Tribe itself is pro-development, and has encouraged resource exploration on the Reservation more actively than any other Tribe in the United States, in pursuit of economic progress. In fact, the Navajo Tribe itself has considered constructing a power plant on or near the Reservation. Actions endorsed by the Tribe, however, do not necessarily reflect the values of the more traditional members at the chapter and community level, particularly those located in the area of the Eastern Navajo Agency. For example, in a resolution passed by Pueblo Pintado Chapter on December 20, 1981, to oppose the proposed NMGS project, one of the reasons stated by the delegates was that "the proposal of electric transmission lines would constitute an unacceptable violation of their spiritual philosophy concerning Mother Earth as a living and lifegiving entity." This resolution by Chapter representatives reflects traditional values more than some of the Tribe's recent resolutions on resource development.

The legal system of land ownership and use rights was imposed by Euro-Americans and is not accepted by many traditional Native Americans in the affected region (e.g., those who are unauthorized occupants of public lands). Traditionally, Native American concepts of land ownership and use rights were not rigidly defined. They were based on the practical needs of the group. Over the centuries, land transactions have taken place in "foreign" languages and legal systems, sometimes resulting in traumatic relocations. In some cases, the little understood differences between surface and sub-surface ownership rights have resulted in some families becoming very wealthy from mineral royalties while their neighbors continued to live in poverty. This can create tensions and cleavages in the community, and lead to accusations of witchcraft (Griffith 1980).

The "checkerboard area" where the proposed generating station would be located is one of the most complicated land ownership and jurisdictional areas in the country. Included in the area are Tribal lands, individual allotments, BLM lands, federal reserve lands, state lands, private lands, Navajo fee lands, and grazing leases (see strip maps included in EIS, Appendix G). In addition, several land exchanges are under consideration by the Bureau of Land Management, as well as the pending selection of 35,000 acres (potentially in the vicinity of the proposed plant site) which may be used for resettlement of tribal members displaced from Arizona by the Navajo-Hopi land dispute agreement.

For these reasons, Navajos are particularly sensitive to land use issues in the checkerboard area. The Land Use Controls and Constraints Technical Report does not identify a conflict between the proposed action and existing official land use policies or plans. The Navajo Tribe, however, will probably argue that their desire to have 35,000 acres near Bisti assigned to the Tribe for settlement of the Navajo-Hopi land dispute would constitute a conflict with a BLM approval of the applicant's proposal. This issue is addressed further in the Technical Report on Land Use Controls and Constraints.

WATER RESOURCES

Many of the concerns Native Americans have expressed about water are no different from those expressed by non-Natives. These relate to general questions of current and future water availability and water quality in the affected region. In the controversy over water resource allocations in the Southwest, however, Native Americans are recognized as a distinct interest group in competition with the federal government and existing water users (including ranchers, mining and manufacturing companies, and municipalities) for water rights. In a Resolution of the Navajo Water Commission dated April 1979, it is stated that "all water, including both surface water and ground water within the exterior boundaries of the Navajo Nation, including the Checkerboard Area, is water belonging to the Navajo Tribe." Renewable supplies of water are close to being fully utilized in the San Juan Basin, and untapped ground-water sources are now extremely expensive to develop. Any energy development project, including the proposed NMGS, which places further demands on water availability could be perceived as being in direct competition with Native Americans and other existing and future claimants for this increasingly valuable resource.

> Stated in the simplest terms, the claims of the Indian tribes rest upon 1) their status as the first occupants of what is now the western region of the United States, 2) the historical policy of the federal government in establishing reservations for Indians which, as interpreted by federal courts, implied the allocation of water for use by Indians on the reservations, and 3) the obligations of the federal government as trustee for the Indian tribes in promoting their economic development. Although certain Indian groups already control substantial water rights, the increasing value of water rights and the steadily rising aspirations of the Indian tribes themselves have led to a dramatic escalation in the claims of Indian tribes themselves for water, well beyond the quantity of rights they currently control. (Brown 1981:38)

Navajos regard water rights as a means to achieve both immediate and long-term economic well-being. Immediate revenues can be realized through lease of water that is surplus to the Tribe's current needs. (The market value of water has increased substantially with new demand resulting from energy development projects in the San Juan Basin.) Water rights could then be used for future industrial projects sponsored by the Tribe, as well as meeting increased demand as infrastructure and services are upgraded. These economic goals could be held by any potential water user in the San Juan Basin, but to Native Americans they are inseparable from deeper values placed on restoring cultural pride, economic self-sufficiency, and a sense of equality with other Americans. "Water rights appear to have become a symbol to American Indians...the Indian interest in water rights far exceeds the economic value of the water itself.... For centuries Indians experienced a steady erosion of their land holdings as they were appropriated by the dominant society. In their view, the same conflict now has shifted to the water rights arena. They are determined that in this case the outcome will be different" (Brown 1981:46-47).

An additional Native American concern about water is the protection of sacred springs. No sacred springs were identified on lands that would be directly affected by proposed project components and alternatives (QRC 1982). However, it is possible that sacred springs more distant from the proposed plant site could be affected by aquifer draw-downs. (See Hydrology Technical Report for discussion of potential effects of the groundwater alternative.)

VEGETATION

Vegetation is of unique importance to Native Americans because of (1) the use of certain kinds of plants in particular collection areas for ceremonial and healing purposes, and (2) the perception of grazing as an important traditional activity. In the Cultural Resources Technical Report, several plant gathering areas are identified on the proposed NMGS plant site and along proposed or alternative water pipeline rights-of-way and transmission corridors on the basis of informant interviews. These plants are used in folk medicine for curing, contraception, and ceremonial purposes. The loss of access to these sites would be perceived by more traditional Navajos as an adverse impact. It may be possible to avoid most of these sites by routing transmission around or away from them.

Any reduction in grazing land availability represents potential economic loss for both Native and non-Native ranchers. To Native Americans, however, grazing symbolically represents a traditional economic pursuit which is highly valued in emotional and psychological ways. Much has been written about the strong attachment of Navajos to grazing activities, and the role of grazing in supporting cultural identity and a sense of well-being (see for example Downs 1964). The problems associated with the stock reduction program sponsored by the federal government in the 1930s when Reservation land was becoming depleted has also been well documented (see, for example, Boyce 1978). The program was deeply resented by Navajos, who interpreted it as an attempt by Euro-Americans to reduce Navajo wealth, security, and well-being.

As mentioned above, many Navajos today maintain close social and economic ties with their relatives or clan members who maintain traditional sheep-herding lifestyles. Thus, even though it may appear that few non-Natives depend on grazing for a living anymore, the reality is that grazing is an integral part of many Navajos' lives. Reductions in opportunities to graze would have adverse indirect effects on the lifestyles of many Navajos. (See Vegetation Technical

Report for discussion of the potential loss of grazing land as a result of NMGS.)

MINERALS

Some minerals have unique value to Native Americans because of their use in making dyes and paints (some of which are used for ceremonial purposes) and for use in preparing traditional foods. In addition, exposed coal seams are valued by Native Americans as a source of readily accessible fuel in semi-isolated areas. Current use of mineral resources in the affected region for these purposes is described in the Cultural Resources Technical Report.

CULTURAL RESOURCES

As has been mentioned, religion pervades traditional Navajo culture. Activities that can be called specifically religious are difficult to isolate and define. As an ethnographic field worker noted, "many of our informants stated that the environment as a whole was sacred. They said that trying to find specific places with sacred significance did not make any sense" (QRC 1982:147). Unlike Euro-Americans, whose definition of sacred sites is mainly restricted to churches, graveyards, and special shrines, Navajos regard a wide variety of locations as particularly sacred in nature.

> For example, a site may be sacred because a religious event could have occurred there, or because it contains specific natural products essential for ceremonies or for healing purposes. These may also be the dwelling place or embodiment of spiritual beings, or they may surround or contain burial grounds. There are also specific religious beliefs regarding each sacred area which form the basis for religious laws governing them. These may prescribe, for example, when and for what purposes it may be visited, or what kind of conduct must be observed. These concepts are in many cases difficult for non-Indians to comprehend. (NMAC-USCCR 1982:60)

Energy development activities have resulted in numerous incidents that would be regarded as "sacrilegious" by traditional Native Americans. Non-Natives who do not share Navajo perceptions of sacred areas may inadvertently violate the rules associated with particular sites. From the traditional perspective, this can result in danger to innocent people or disruption of natural harmony because of the presence of uninformed humans in areas filled with evil spirits or strong supernatural forces. Specific sacred sites of importance to Navajos and Puebloans in the plant site area and along water pipeline and transmission line corridors are described in the Cultural Resources Technical Report.

The purpose of this section is to suggest mitigation measures that might be taken to enhance potentially beneficial impacts or reduce potentially adverse impacts of the proposed action on the values and lifestyles of affected Navajos. These are prelimimary ideas meant to stimulate discussion and decisions prior to drafting the EIS.

One potentially beneficial impact to traditional Navajos is employment. While wage employment on energy projects could increase value conflicts for some traditional Navajos, jobs would also enhance opportunities for purchasing material goods, supporting relatives and clan members, or contributing to ceremonials.

Steps could be taken to ensure that Navajos would have an opportunity to reap some of the potential benefits of the project. These measures would enhance potentially beneficial impacts associated with the project, and could help to counterbalance any unavoidable adverse impacts to traditional Navajos. The following measures, if taken, would increase Navajo employment opportunities associated with NMGS:

- Establish preferential hiring policies for NMGS.

- Establish a mechanism for projecting and monitoring NMGS workforce requirements and communicating these to affected

Navajos. This could be a cooperative effort among the applicant, its contractors, local chapters, the Tribe, and labor unions.

- Assist the Tribe in establishing and maintaining a mechanism for monitoring labor force characteristics in order to match training programs with skill needs.

- Provide training and apprenticeship programs for Navajo construction and operation workers, beginning prior to project construction and continuing through the operation period. This should be most effective as a cooperative effort between the applicant, its contractors, the Tribe, labor unions, and perhaps other major employers in the area as well. Existing programs such as the Navajo Skills Center and training programs at San Juan and Four Corners power plants (for operations training) could be utilized and expanded.

- Support the creation of a regional training center for power plant workers.

Other measures could be taken to reduce potentially adverse impacts on traditional Navajos. These include the following:

- Select water pipeline and transmission line routes to avoid sacred sites and gathering areas which may be identified in the affected environment prior to construction (see Cultural Resources Technical Report).

- Minimize loss of Navajo grazing lands through route selection planning, or compensation of such loss by making alternative grazing lands available.

- Establish an on-going mechanism for working with the local Navajo leadership and maintain communication links between the applicant, the Tribal government, local chapters, and Eastern Navajo Agency to help identify potential problems (such as in-migrating workers, inadequate housing or services, need for compensation) and to work toward solutions cooperatively.

Further measures could be taken that would enhance project effects on Navajos in the affected environment. These cannot be considered mitigation measures since they would not necessarily ameliorate specific impacts that have been identified. Rather, they would benefit affected Navajos and thereby help counterbalance some of the unavoidable adverse (i.e., unmitigatable) impacts that the project could cause. Such measures include:

- Improve local facilities and services utilized by Navajos when possible during project activities. This could include road improvements.

- Construct water supply points along the water pipeline route for use by local people.

- Supply construction materials, equipment, and/or labor to NTUA or cooperatives in lieu of filing a bond for transmission line construction with the Tribe. This would facilitate eventual supply of power to homes and communities in the affected area.

D.7
UNAVOIDABLE ADVERSE IMPACTS

Based on the analysis presented in Sections D.4 and D.5 some impacts would occur to traditional Navajo values and lifestyles that might not be readily mitigated. These unavoidable adverse potential impacts include:

- Effects on flow levels of the springs in the Chuska Mountains, which may be considered sacred
- Increased stress and concern about disruption of natural harmonies due to disturbance of sacred or supernatural areas by unknowledgeable people
- Perceived need for more frequent sponsorship of ceremonials and rituals to attempt to restore natural harmonies
- Acceleration of the rate of culture change and increased incidence of value conflicts. New stresses could manifest as increased alcoholism, drug abuse, or other social problems
- Competition with the Navajo tribe for water rights; potential reduction of viability of a future Tribe-owned and -operated generating station in the area

- Temporary disruption to grazing activities; potential loss of some grazing land

- Potential perceived need to relocate due to the altered nature of the environment and daily activities in the affected region.

GLOSSARY

Acculturation Process of culture change stimulated by contact with members of another cultural group.

Capital funds Special funds set up to account for specific capital expenditures, such as sewage plant construction.

Cohorts groups of people of the same age period, usually grouped by 5 or 10 years (0-5 years, 5-10 years, etc.).

Culture core The central features or traits of a particular culture that persist over time and form the basis for a culture's unique identification.

Economic base A method of classifying all productive activity into two categories: (1) basic industries, which produce and sell goods that bring in new income from outside the area; and (2) service industries, which produce and sell goods that simply circulate existing income in the area.

Enterprise funds Funds budgeted to cover costs of operating municipal services (such as water distribution or refuse collection) for which revenues are generated through user charges that are set to cover costs.

Grazing community Range units combined into a larger administrative unit, as determined by Navajo District Land Boards based on common interest.

Indirect costs Part of the cross-impacts among economic areas. They are costs that do not result directly from a proposal but from the changes which the proposal will bring about. For example, a new industry locating in a community may attract new population, thereby creating a number of indirect costs with their demands for additional housing, services, etc.

Input/output analysis A method for studying the relationships among industries to determine the overall effect on the economy of expansion or contraction in one industry.

Labor force participation rate The percentage of total population, age 16 and over, that is part of the labor force.

Local workers People who do not change their place of residence to work on a project.

Multiplier effect The total number of jobs resulting from the employment of one person in a basic industry. The multiplier may also apply to income or dollar sales.

Nonlocal workers People who change their place of residence to work on a project (also referred to as newcomers).

Per capita income Derived by dividing total personal income received by an area during a year by an area's mid-year population.

Personal income As defined by U.S. Bureau of Economic Analysis, it is the current income received by residents of an area from all sources. It is measured before deduction of income and other personal taxes, but after deduction of personal contributions to social security, government retirement, and other social insurance programs. It includes income received by persons from business; federal, state, and local governments; households and institutions; and foreign countries.

Standard Industrial Classification (SIC) Codes Established by the U.S. Office of Management and Budget (OMB), SIC Codes provide a numeric system of classifying employment establishments by type of activity. The SIC Code divides the nation's economic activities into 10 broad industrial divisions identified by the first digit, with more detailed breakdowns of two, three, and four digits.

Transfer payments As defined by BEA, they are receipts from government and business for which no service is rendered currently: pensions, unemployment benefits, disability benefits, Medicare benefits, direct relief, bad debts absorbed by business establishments, corporate gifts to private nonprofit institutions, etc.

Tribal fee land Land owned in fee simple by the Navajo Tribe.

Tribal lease lands Land leased to the Navajo Tribe under Sections 3 and 15 of the Taylor Grazing Act, State of New Mexico, and private lands leased to the Navajo Tribe. (Navajo tribal ranches are not included under this definition.)

Tribal trust land Land, or any interest therein, held by the United States in trust for the Navajo Tribe, and land that is held by the Tribe subject to federal restrictions against alienation or encumbrance.

Underemployment Includes all persons whose skills, education, or training qualifies them for a higher-skilled or better-paying job than they presently hold. It also includes persons only able to find part-time rather than full-time work in their fields.

Unemployed persons As defined by the U.S. Department of Labor, the term includes all civilians who were not employed but were available and actively seeking work within the past four weeks, were waiting to be called back to a job from which they had been laid off, or were waiting to report to a new job scheduled to begin within 30 days.

Worst-case analysis As directed by CEQ guidelines, analysis performed using the most conservative assumptions in the absence of complete data.

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FEDERAL AGENCIES

- U.S. Bureau of Land Management
  - Farmington Resource Area Headquarters
- Bureau of Indian Affairs, Branch of Land Operation, Navajo Area Office
- National Park Service

NEW MEXICO STATE AGENCIES

- Building Trades Council
- Employment Security Commission
- Highway Department

LOCAL GOVERNMENT AGENCIES

- City of Aztec
  - City Clerk's Office
  - Municipal School District
  - Planning Department
  - Municipal Electric Utility
  - Fire Department
- City of Bloomfield
- City of Gallup
  - City Manager
- City of Farmington
  - Electric Utility
  - Planning Department
  - Police Department
  - Municipal School District
- San Juan County
  - Planning Department
  - Sheriff's Department
- Central Consolidated School District
- McKinley Area Council of Governments (MACOG)
- Human Services Department, Social Services Division

TRIBAL

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    - Land Commission
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- The Navajo Tribe
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    - Cultural Resources Division
    - Department of Agricultural Resources
    - Division of Community Development
    - Division of Resources
    - Navajo Indian Irrigation Project
    - Office of Navajo Labor Relations

OTHER

- Adcock and Associates, Inc.
- Anthropology Research Consulting Service
- Arizona Public Service Company, Personnel Information Center
- Burns & McDonnell, Escalante Generating Station
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